RAILROAD GAZETTE

FRIDAY, OCTOBER 23, 1903.

CONTENTS

ILLUSTRATED:
The Miller System of Mechanical Refrigeration..... 752
Some Interesting Boring Machines..... 753
Grab-Irons on Locomotive Front Ends..... 754
Consolidation (2-8-0) Locomotive for the Great Western of England..... 755
Cambria Cars With Caswell Drop Doors for the Burlington..... 756
Class D2 Mogul (2-6-0) Locomotive for the "Soo Line".. 757
A Motor-Driven Turret Lathe..... 758
The Schwabe Metallic Packing..... 758
Drop End for Steel Gondola Cars..... 759
Caledonian Six-Coupled Express Locomotive..... 764
CONTRIBUTIONS:
Brunel and Gooch..... 751
The Financial Situation and the Railroads..... 751
EDITORIAL:
Grab-Irons on Locomotive Front Ends..... 760
Summary of the Case Against the Erie Canal Enlargement..... 760
September Accidents..... 761
Lehigh Valley..... 761
Erie..... 762
Boston & Maine..... 762
New York, Ontario & Western..... 763
Editorial Notes..... 760
New Publications..... 763
Trade Catalogues..... 763
MISCELLANEOUS:
Protecting Solid Bridge Floors..... 751
Maintaining Line, Surface and Gage..... 753
The Roadmasters' Convention..... 754
Purifying Water for Locomotives..... 755
Ties and Tie Plates..... 756
Trade Union Outrages in September..... 756
Annual Inspection of Bridges and Culverts..... 757
Safety Appliance Law—Extensions of Time..... 758
Train Accidents in the United States in September..... 759
General Track Work..... 763
Trade Union Liability for Damages..... 763
The Depression in British Shipping..... 764
GENERAL NEWS:
Technical..... 764
The Scrap Heap..... 765
Meetings and Announcements..... 766
Personal..... 766
Elections and Appointments..... 766
Locomotive Building..... 767
Car Building..... 767
Bridge Building..... 767
Railroad Construction..... 768
General Railroad News..... 768

Contributions

Brunel and Gooch.

To the Editor of The Railroad Gazette:

I notice with regret that the title to the illustration of the engine "Great Western," appearing on page 736 of your last week's impression, names I. K. Brunel as the designer of the engine, instead of Daniel Gooch. Whilst the error is obvious to the reader of the text, I think it well, in the interest of accurate history, to call your attention to it.

HERBERT T. WALKER.

The Financial Situation and the Railroads.

To the Editor of The Railroad Gazette:

It is interesting to note that notwithstanding the great decrease in values of investment securities during the past year, the chief factors which have had such a depressing influence on public confidence in former times of uncertainty are now entirely lacking. The railroad situation to-day is sound. Not only have earnings increased materially, but the physical condition of railroads has improved. This is due to a normal expenditure for betterments of roadbed and equipment. Railroads have not outstripped the growth of the country as was the case in the panic of 1873.

Construction of railroads in this country has generally been carried on by bond issues. The trouble in 1873 lay in the fact that the increase in railroad mileage was out of proportion to the increase in population and wealth. During the three years previous to 1873, railroad mileage increased 42½ per cent.; population increased 6⅛ per cent., and wealth increased about 22½ per cent. If we calculate traffic in proportion to wealth, we see that this tremendous increase of new railroad mileage was more than the traffic could bear and thus prevented economy in transportation. People seemed to forget that a road could not make net earnings the minute the rails were down, and that traffic must be developed before a return on the investment could be expected. The greater part of the railroads in the country at this time issued large amounts of second lien bonds and stock which had no intrinsic value but merely represented an optimistic faith in the probable development of the country, or in future earnings. Without conservatism or caution, new companies were incorporated and new lines were built alongside of old lines. Such a course was doomed to failure, and as soon as the people began to realize that the interest on their money was not forthcoming, they refused to supply the railroads with any more funds. Then followed one of the worst panics the country has ever seen, which caused the failure of not only most of the new railroad projects in the country, but also of many of the large banking firms who found themselves left with unsalable railroad securities on their hands.

Recovery of the financial world from such a shock was naturally slow, as public confidence, once lost, is not easily regained. The railroads had received a severe blow, and reaction was quite slow at first, but as public confidence was gradually restored, it increased its momentum and reached its highest point in 1893, when another financial panic overtook the country.

This depression was not due to the railroads, as in 1873, but to a demoralization of our financial system by the passage of the Sherman Act, and the fear that we were drifting to a silver basis. Although not responsible for the panic through lack of earnings or over capitalization, as formerly, the railroads suffered from lack of income due to the general depression of business in the country. The shock was even greater than in 1873, because the total mileage affected and the decline in values were both more severe. During the years 1893 and 1894, 192 railroads, representing 40,818 miles and a capitalization of about $2,500,000,000 in stocks and bonds, or one-quarter of the total railroad capitalization of the country, went into the hands of receivers.

Recovery of the railroads from the panic of 1893 was at first very slow. During the period from 1897 to 1901, however, a marked improvement was evident, which culminated so to speak, in 1902 in the general improvement in the condition of the railroads in the country. A table of railroad earnings, operating expenses, etc., compiled by the Interstate Commerce Commission, shows clearly the gradual increase in railroad business during the past decade. The first three figures are given in thousands of dollars, the last three ciphers being omitted:

	1894.	1897.	1899.	1902.
Gross earnings.	1,073,362	1,122,690	1,313,610	1,726,380
Oper. expenses.	731,414	752,525	856,969	1,116,249
Net earnings..	341,948	369,565	456,641	610,132
Per cent. exp..	68.14	67.06	65.24	64 66
Ton mileage..	80,335,104	95,139,022	123,667,257	157,289,370

With such growth and with prosperity at its highest point, the natural question is what has brought about the depression of the last 10 months? The causes of the 1873 and 1893 depressions are surely lacking, as we have no problem of over capitalization or of over expansion of railroads to face, nor are we threatened by any currency disturbance. The trouble seems to lie in the fact that the country has had too much prosperity in too short a time. The supply of capital is, for the time being, inadequate to meet the demand; in other words, surplus income which supplies the real capital of the country has been invested too fast and is not now available. The prosperity of 1902 has proved too much for the country at large to bear. People who have had larger incomes through this prosperity have lived ahead of their incomes and have not saved in proportion, as they did in hard times. Business has advanced too rapidly, and now when new capital is needed, there is no surplus income to supply the funds. The decrease in the quoted value of railroad securities is not due to the fact that their intrinsic value has lessened materially, but because people who were in need of money have been obliged to convert their good stocks into cash. Nearly all the recent railroad returns show that net earnings are increasing and that the transportation facilities are taxed to the utmost in order to handle the increase in traffic.

S. C.

Protecting Solid Bridge Floors.

The committee of the Association of Railway Superintendents of Bridges and Buildings, appointed to report on this subject, sent out circulars with questions. Some of the questions and replies are given in the following:

What shape are the sections of solid floors in use on your road?

Atchison, Topeka & Santa Fe.—We use transverse I-beams spaced from 12 to 20 in. apart-centers and resting upon the bottom flanges of the girders, or stringers, or upon shelf angles riveted to same. On top of these I-beams is a course of creosoted timber from 2 to 5 in. thick, and above this the ballast. Where we use deck girders with a ballasted floor, we have covered the girders solid with a course of creosoted timber, the thickness varying to suit the space between the girders, and top it out with the regular course of ballast. In both of these schemes the metal work is left entirely uncovered so that all parts can be examined and can be cleaned and painted by the ordinary methods.

New York Central.—We either use a solid trough floor, consisting of vertical web plates, horizontal top and bottom plates, and angle-irons at corners for riveting same together, or we build solid floors of I-beam sections with a solid plate on top, which we generally make $^{7}/_{16}$ in. thick. The latter is preferred.

Pennsylvania Lines West of Pittsburg.—Triangular and rectangular troughs.

Are the track rails supported directly by the steel floors?

Atchison, Topeka & Santa Fe.—We have one bridge, a 90-ft. girder span, in which the I-beams are topped out by a steel deck plate and the rails are fastened to the running plate which rests on top of the deck plate, without the use of ties. We have found no method by which we can with certainty protect this kind of floor from rust. It is also extremely noisy under traffic. In Chicago, where a large percentage of track elevation bridges have been made in this manner, the deck plates have been covered with a gravel tar roofing protection. These floors do not leak for perhaps an hour after a rain storm begins, but they are continually dripping water for several days after the storm. In many cases where this gravel tar roofing has been cut into, water or moisture was found on top of the deck plate underneath the roofing, and the deck plate has always been very rusty.

Pennsylvania Lines West of Pittsburg.—In two or three cases, due to limited depth from rail to clearance, the rail rests on the troughs, with fiber mats interposed. We have no cases where rail rests directly on metal work.

Lehigh Valley.—In some cases where the height of floor is limited, the rails rest on a distributing plate riveted to troughs. The rails are fastened by means of clips and bolts. Both the clips and bearing plates are insulated by fiber mats on account of electric block signals.

Are the trough sections filled to the top with ballast to carry tracks, or do you place ties in trough sections?

Pennsylvania Lines West of Pittsburg.—Troughs are filled with concrete or with stone ballast, and 6 in. or more of ballast above this to bottom of tie. In no cases have we any ties set in troughs.

New York Central.—Trough sections are not filled to the top with ballast to carry tracks, as, if this could be done, we would prefer the I-beam and plate. Our object in using trough floors is invariably to get the ties into the trough sections and thus reduce the distance from base of rail to under clearance of structure to minimum.

Delaware, Lackawanna & Western.—We fill the trough sections with concrete and use ballast on top of that.

Lehigh Valley.—We line the troughs with asphaltum, using small broken stone to top of troughs, and then cover the whole surface 1½-in. thick with asphaltum concrete, and ballast the track on top of the asphaltum. This is not entirely satisfactory.

What style of drainage do you use?

Atchison, Topeka & Santa Fe.—The solid-floor structures being made with I-beams, are covered with creosoted timbers resting directly upon the tops of the girders. Where obliged to give a water-tight floor, the clear head room for street underneath is fixed at center of street crossing. One end of the bridge is then tipped up and the other down sufficiently to make the timber floor drain from one end to the other and the tracks are laid to grade, the ballast being deeper at one end of the bridge than at the other. The material is tongued and grooved and the seams are calked with oakum or with cotton and filled with calker's pitch. After calking, the top of the floor is covered with one heavy coat of hot coal tar.

Pennsylvania Lines West of Pittsburg.—When troughs are filled with concrete, an asphalt covering is used to make water-tight and to shed surface water. When troughs are filled with ballast, the troughs have 1-in. holes in them, and the drainage is carried away by shallow channel-irons.

New York Central.—Asphalt concrete at the bottom of the trough is shaped to afford drainage. At the lowest point, where this layer would be about 1½ in. thick, gas-pipe drainage nipples are placed in the bottom of the troughs, passing through them; the nipples being threaded and screwed into the bottom trough plate.

Lehigh Valley.—A 2-in. diameter short galvanized iron pipe is screwed to trough at center, and the asphaltum lining shaped to carry drainage to pipe.

Do you paint the steel floor before any protection is placed in troughs?

Atchison, Topeka & Santa Fe.—Use no type of steel floor which cannot be painted at any time without disturbing the ballast.

Pennsylvania Lines West of Pittsburg.—Two heavy coats of red lead paint.

New York Central.—The ballast side of the steel floor is first painted with red lead and then given a coat of refined asphaltum and straight-run coal tar pitch heated to a temperature of 300 deg. F. and mixed 10 parts of the former to 30 parts of the latter.

Pere Marquette.—Paint the steel floor and cover it over with a coating of asphalt to protect the upper surface.

Lehigh Valley.—Paint the floor; but if rust can be kept from steel before asphaltum lining is placed, painting is not necessary, since the hot asphaltum will destroy the paint.

Michigan Central.—To protect the floor plate under the ballast we first heat the floor either by means of fire suspended underneath, or by the flame of a torch applied in top. When the floor plate is quite hot, we pour on melted asphalt and form a coating nearly or quite ¼ in. thick, applied as two coats. This has proven very satisfactory.

How do you protect the underside of solid steel floors to shield them from the action of gases, etc., caused by trains passing under bridge?

Atchison, Topeka & Santa Fe.—We cover the entire lower surface of the bridge with a course of ¾-in. matched and dressed flooring. Directly over the track is fastened a strip of hard steel which extends the whole width of the bridge, and is from 36 to 46 in. wide.

Pennsylvania Lines West of Pittsburg.—By (a) concrete on expanded metal; (b) a paste made of concrete and red lead; (c) tongued and grooved boards made into a ceiling.

New York Central.—The underside of solid floors is painted the same as the other steel work—two coats of red lead and two coats of New York Central asphaltum varnish. In one case, where the structure comes close to the smoke-stack of locomotives, a shield of expanded-metal lath plastered with cement mortar is suspended. This has been in service about three years and has been fairly successful.

Mr. Wilbur J. Watson, Bridge Engineer of the Osborne Engineering Company, Cleveland, Ohio, writes: In several cases where the panel length is not too long, we are replacing the usual steel stringers with concrete-steel stringers. We find that this style of construction is actually cheaper in first cost, in many instances, than the usual construction of steel stringers and white oak floor, besides possessing the added advantages of permanency and rigidity. Concrete-steel construction should be

used only when carefully designed, and inspected by competent persons, this being more essential for this class of construction than for the older and better understood methods.

Mr. George F. Powers, General Foreman of Bridges and Buildings of the C., L. S. & E. R. R., makes a statement of the cost of asphalting Noble street subway, Chicago. The average cost, including labor and all materials for cleaning the steel work and asphalting it was $.08½ per sq. ft.

The report is signed by A. O. Cunningham, Chairman; Geo. F. Powers, D. W. Lum, Albert C. Keith, C. P. Austin, F. E. Schall.

The Miller System of Mechanical Refrigeration.

The movement of all traffic, so far as the railroads are concerned, should begin and end with placing it in cars, hauling over the route, and delivering to the consignee. Any additional obligation, such as icing this freight, finding the ice, and carrying it free of charge, is, logically but not always practically, outside of the province of the carrier.

The ideal refrigerator conveyance should, by its own mechanism, supply its own refrigeration just as it now prevents the absorption of heat from the outside air by its insulated walls. To accomplish this, a simple ice-making machine operated from the car axle may be the most economical device. The power thus absorbed is cheaper than the cost of ice; a simple and durable ice machine is not a difficult machine to make. Such a machine consists essentially of a refrigerating gas compressor, condensing pipes for liquefying the compressed gas, and frost coils to utilize the refrigeration of the liquid gas returning to the gaseous state. The compressor circulates the gas through the frost coils and condensing pipes using the gas over and over again. When the car is hauled the gas is circulated and refrigeration carried on. When the car stops, the ice already made keeps the temperature down until the car is again started. The machine should be mounted outside the car, must be dust-proof and self-oiling, must be light and have as few parts as possible. The axle-power transmitting device must be durable and capable of furnishing the power under all conditions of track, and in no way be affected by shocks from any kind of rough handling in switching cars. It must be so made as to be easily and quickly removed from the axle by ordinary car men in case of a bent or condemned axle or wheels that will not pass inspection. The ice machine should be capable of being put into and out of gear by simply turning a handle, so that the car can be used for either general merchandise or perishables at the will of the agent. The refrigerating gas must be harmless to the cargo, non-combustible, and of the highest possible efficiency. There must be no valves to turn off or on, or any function whatever to be performed when the car arrives at its destination or stops in freight yards, nor must there be anything to replenish at frequent intervals such as oil and gas. Finally there must be provision for storing up part of the refrigeration in the form of ice so that plenty is available in case of prolonged stoppages.

The apparatus of the Miller system meets these conditions with a simple and strong mechanism. There are four parts to the equipment: The ice machine, shown in Figs. 2 and 3, is of the carbon dioxide type, used in the British, German and American merchant marine, because of its safety, small dimensions, and high efficiency. In its adaptation to car service, the flywheels, cross-head, connecting-rod, etc., are enclosed in the shell. This shell also forms the A-frame, and journal bed, and is perfectly dust-proof. The flywheels are connected by a crank pin as in straight-line engines, and bevel gear teeth are cut on the face of one of them. The cross-head is turned out of one piece of cast steel and the connecting rod is made of a special design without bolts or nuts. The compressor cylinder is bored out of a solid steel forging and screwed into the frame. The lower half of the frame is filled with about two gallons of lubricating oil which is flooded over the whole machine by the motion of the connecting rod but which cannot escape because the joints of the shell are made tight with rubber gaskets. The capacity of the machine is 1¼ tons of ice in 24 hours and the measured power required to operate it is 1.3 h.p. A pull of 35 lbs. on the rim of the car wheel will turn the machine at full capacity and this is the increased drawbar pull per car, regardless of speed.

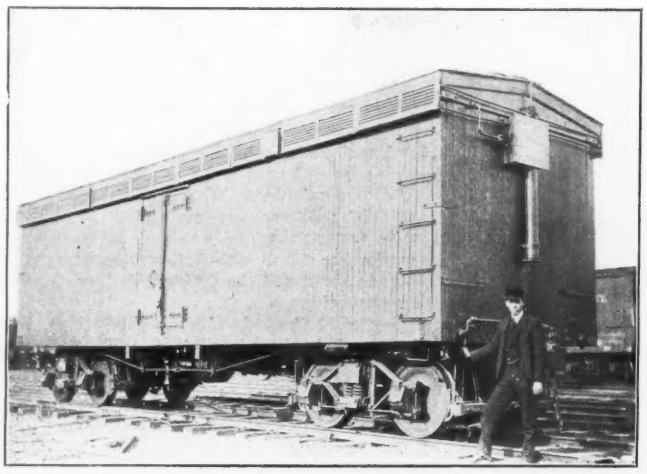


Fig. 1.

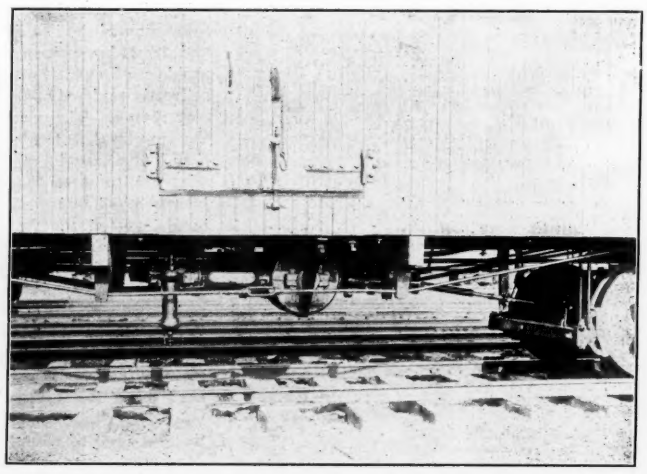


Fig. 2.

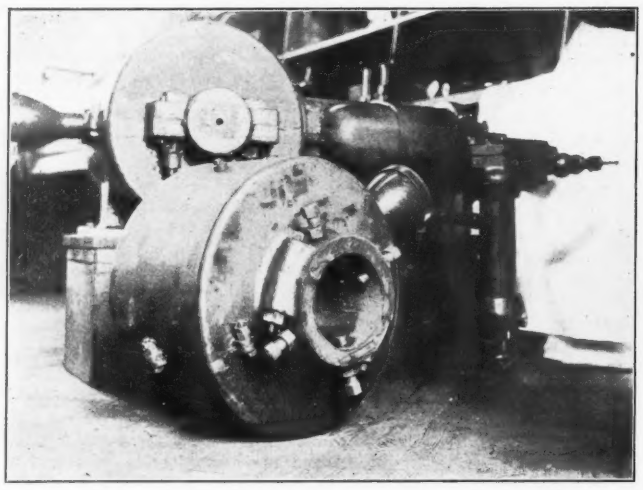


Fig. 3.

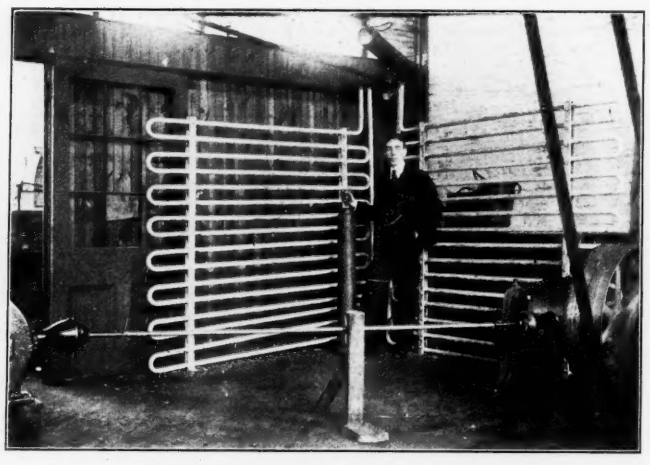


Fig. 4.

A test was made to determine the amount of this pull at the rim of the wheel. With the car jacked up, the force applied to the wheels proved to be more than 100 lbs. due to the weight of the wheels and the friction of the reversed journals. No reliable measurement could be obtained in this way so that finally a light 33 in. pulley in the shop was used on which the transmitter was mounted on a shaft as in Fig. 4, connected by a light shaft to the machine and the pull measured on the rim of the 33 in. pulley.

The ice machine in service is bolted to the first and second intermediate sills underneath the car and operates without care or attention. A perfected form of oil seal stuffing box is used which makes the packing automatically tight as long as there is any oil present in the reservoir of the machine. This relieves all uncertainty about leakage of gas through the stuffing box as there is always ample free oil available in the system which cannot escape under any circumstances.

The axle power transmitter is shown clearly in Fig. 3. It consists of a split steel gear, with its hub elongated to form a sleeve, capable of being centered on any axle not over 6½ in. diameter. The sleeve also affords bearing for the shaft of the driven gear. In the ice machine one gear is cut on the inner face of one of the flywheels and the other gear has a bearing on the shell of the machine. Because of the manifold motions of the truck the shaft joining the two pairs of gears is replaced by a slip-joint shaft with universal joints at each end. This shaft is short and powerful, can telescope up or lengthen out some 8 in., and on a straight track is in true line with the gears so that no wear is thrown on the universal joints except when on curves. The joints are made in three pieces and in neither them nor the shaft are any nuts or rivets used. The shell or casing of the power transmitter is filled with oil and the joint of the two halves made with gaskets. It requires practically no attention and it requires only one hour and ten minutes to take the entire transmitter off of one axle and put it on another.

The third part of the equipment is the condenser. This is a pair of coils of electrically welded iron pipe, provided with means for covering the pipes with evaporating water, and fastened on pipe-hooks screwed to the siding of the car under the facia. They are covered with shutters as shown in Fig. 1. The gas from the compressor or ice machine is liquefied under pressure by the combined cooling effect of the air and evaporating water on the condenser piping. In Fig. 1 the coils are shown as meeting across the end of the car in a gage box and provided with a liquid receiver. This is not done in standard equipments as it makes the piping liable to damage from "cornering" cars in switching. Instead the piping meets inside the car behind the ice-boxes. Here the liquid gas collects in a horizontal receiver and passes through a constant-pressure reducing valve into the frost coils.

The frost coils, shown in Fig. 4, are two flat trombone coils of extra-heavy iron pipe electrically welded throughout. They are placed in front of the ice-boxes but behind the wooden guard partitions which protect the ice-boxes from the weight of the cargo. By turning the set-screw of the reducing valve, any desired temperature can be maintained in these coils, ranging from — 4 to 35 degs. Fahr. The ice, or ice and salt in the boxes is in a state of cold storage while the car is in motion, and is in no way drawn on for refrigerating the car. Frost also forms on the coils very rapidly, at the rate of about ⅜ in. per hour, so that at the end of 10 hours two solid walls of frost are interposed between the natural ice and the cargo. Under these conditions it is not necessary to put more than 500 lbs. of ice in each end for initial icing unless very warm cargo is introduced (such as South Carolina strawberries), and this only to provide an ample supply in case of early stoppage.

In the cars built by the company the ice-boxes are dispensed with and the coils are covered with expanded metal and placed in pans 14 in. from the ends of the car with wooden guards in front of them. They hold one ton of ice each and the freight room is increased so that 32 ft. of clear freight room is available in a car 35 ft. long outside over all. Other cars of similar size are not more than 27 ft. long in the clear. The present boxes can be taken out of any end ice-box car and the above arrangement substituted. Another arrangement of the frost coils is to place them under the ceiling with a false ceiling to shed the drip and circulate the air. This arrangement is particularly adaptable for fruit service as it prevents the top layers of fruit from deterioration and gives the entire length available for freight room. In meat service the meat hook frames interfere with this overhead system.

The frost formed on the coils weighs about 48 lbs. to

the cu. ft. and a 10 hours' deposit weighs about 1,000 lbs. After passing through the frost coils the gas returns to the ice-machine and is compressed again into the condenser coils and thus used over and over again. The total apparatus weighs at present 1,800 lbs. When made entirely of cast steel its weight can be further decreased to 1,400 lbs.

A charge of liquid gas for the machine consists of four, 20-lb., drums of liquid carbonic acid gas. This gas costs $1.50 per drum, and is sold all over the country in drums of this size. A charge will last the machine indefinitely, the gas being simply circulated through the system by the compressor, changing from a liquid in the condenser to a gas in the frost coils. About once every three months it may be necessary to charge in another drum in case of leakage. As there are few joints in the system, the chance for leakage is very small. To charge in another drum takes about 10 minutes.

The first experimental car was operated with short hauls on the Third and Berks street branch of the Philadelphia & Reading at Philadelphia. The frost coils were immersed in tanks full of water which was to be frozen for an ice reserve. The tanks leaked and when empty, promptly filled with the frost formed on the pipes, and they were finally discarded as useless. The power was turned on and off with a friction clutch on the shaft. This shook to pieces in service, and was finally replaced by an eccentric bushing on the gear journal so that the mechanism could be thrown in and out of service with a turn of the wrist as in the back-gear of a lathe.

The first successful run of any length was from Philadelphia to Harrisburg over the Pennsylvania Railroad. The car then went to Altoona and new universal joints made of axle steel were put on the shaft at the P. R. R. shops. The car then went to Pittsburg and Cleveland. It was loaded for Buffalo and from there was run to Despatch, N. Y., where it was tested, standing still at the shops of the Merchants Despatch Transportation Co., the car being run by a small engine with the axle transmitter thrown out of gear. Owing to the freezing effect of compressed air in the ports of the small engine, the machine could only be run at one-fourth full speed, but even under these conditions a temperature of 46 deg. was easily obtained in a few hours run. The car was later returned to New York under refrigeration and has since been on trips to Buffalo and points on the Pennsylvania R. R. On all these trips the car was loaded with produce or general merchandise, whichever was offered for quickest transportation. The result of the experience gained on these experimental runs was to reduce the whole apparatus to four simple parts, eliminate all nuts and bolts, substituting for them forgings and split cotters and in various ways cheapen and simplify the equipment.

This apparatus is manufactured by the U. S. Refrigerator Car Co., 106 Wall street, New York City, and 1001 Chestnut street, Philadelphia. Mr. Warren H. Miller, the inventor of the apparatus, is President of the company.

Maintaining Line, Surface and Gage.

To maintain perfect surface, line and gage, it is essential first, to have uniform banks. They should be uniform in width and height and have perfect drainage. The banks or shoulders should be at least 16 in. below the top of the rail so that the dirt shoulder may not hold water to cause softening of roadbed. When doing new ballasting, in making the first raise the track should be perfectly surfaced by tamping with shovels, being careful that no part of a rail remains low. The second raise should have a perfect surface for gravel, cinders or burned clay ballast. Shovels may be used for tamping second raise but for stone ballast the tamping picks must be used outside the rail, and tamping bars inside. A tie should be tamped 16 in. inside the rail or about the same as outside, thus leaving 22 in. of the center of the tie untamped, which will prevent the track from becoming center bound. This space should be filled well under the tie, but not tamped solid. A shoulder of ballast sufficient to hold the track in line, for first class track should be 5 ft. outside the rail or 2½ ft. level and 2½ ft. slope, the outside to be dressed to a perfect line. It should be a principal part of the duty of section foremen to carefully gage the track each winter. He should be supplied with tie plugs and instructed to plug each hole where spikes have been removed.—*From a report by Mr. C. Linehan (C., R. I. & P.) before the Roadmasters and Maintenance of Way Association October, 1903.*

Some Interesting Boring Machines.

Figs. 1 and 2 show two types of a heavy double-spindle boring machine for boring locomotive connecting rods, and all heavy facing and counterboring operations. This machine is really a combination of two boring machines mounted on one base. The bed plate is massive and has a working table 11 ft. 2 in. x 2 ft. 0 in. inside the oil grooves. The inside of the table is hollow and forms an oil tank from which lubricant is supplied to the cutting tool, each spindle being provided with a separate pump.

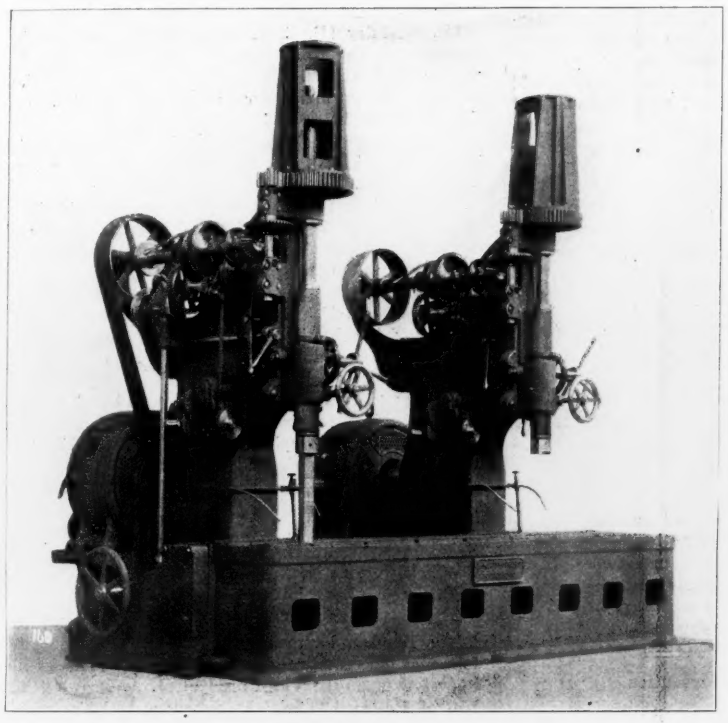


Fig. 1.—Baker Belt-Driven Double-Spindle Boring Machine with 24-in. Spindle Feed.

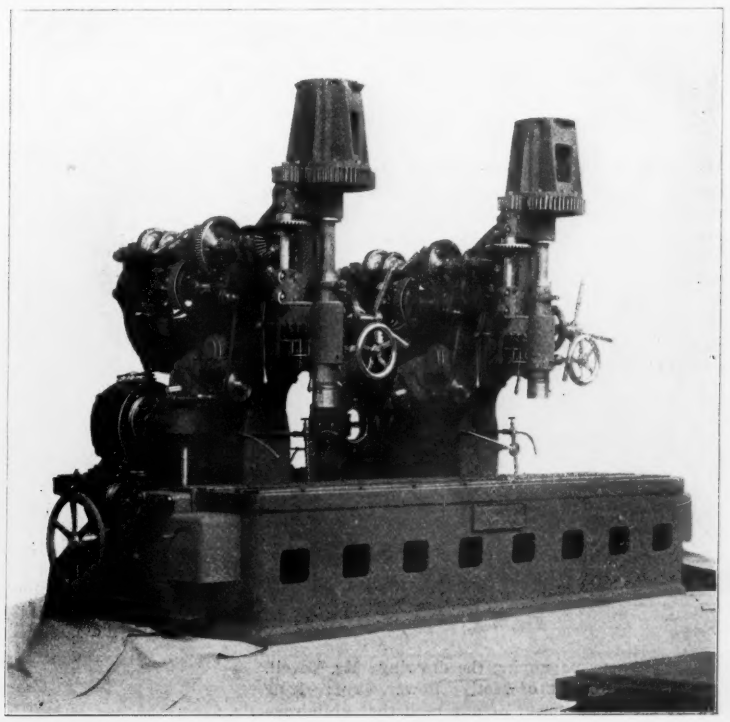


Fig. 2.—Baker Chain-Driven Double-Spindle Boring Machine with 14-in. Spindle Feed.

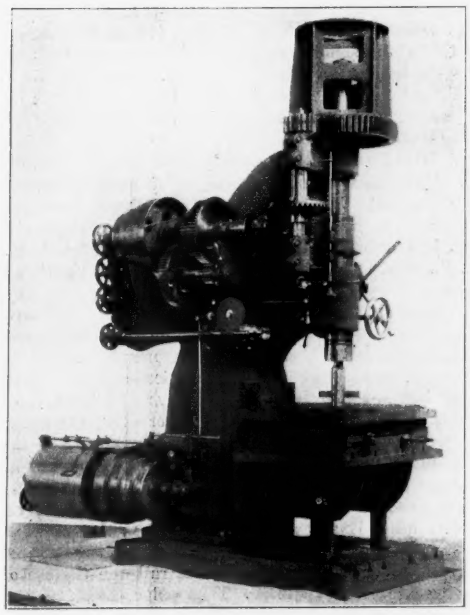


Fig. 3.—Baker Boring, Facing and Tapping Machine.

The machine in Fig. 1 has a spindle feed of 24 in. and is belt driven. It is triple back-geared, the greatest ratio of gearing being 51 to 1. In addition to the three changes obtained by the back gears, the motor, which is a Westinghouse type "S," 13-h.p., 110-220 volt, has a speed variation of 4 to 1. The controllers are placed at the ends of the long table in the same manner as in Fig. 2. These have 15 steps for the forward speed, and 6 steps for the reverse speed, making, with the back gears, 45 speed changes forward and 18 speed changes reverse, giving a speed variation from 3 to 90 r.p.m.

The machine in Fig. 2 has a spindle travel of 14 in. Each spindle is driven by a General Electric 10-h.p., 220-volt motor, by means of a Renold silent chain, the ratio of gearing from motor to spindle being 175 to 1. The machine is triple back-geared, and these gears are again compounded, giving six changes of speed. Intermediate speeds are obtained by means of field control. The speeds on this machine vary from 3½ to 43 r.p.m. The following description applies to both spindles: Positive-geared, driven by a Renold silent chain; 12 changes quickly obtained, varying from .1 in. to .005 in.; both frames adjustable along the base to vary the center distance, the left-hand frame being adjustable by power. The construction admits of the frames being easily and securely fastened to the base, so that the spring resulting therefrom is reduced to an inappreciable quantity. The spindles are 3½ in. inside of the quill; diameter of quill 5¼ in.; distance from center of spindle to frame 18 in.; height of table above floor 28 in.

Fig. 3 is a boring, facing and tapping machine, designed for the heaviest work in locomotive and railroad shops, and shops manufacturing large steam fittings. It is adapted for heavy boring, counterboring and facing of steel forgings and castings where a large amount of metal is to be removed rapidly, and for boring and tapping pipe fittings up to 16 in. in diameter.

The main spindle is a high-carbon, open-hearth forging, 4¾ in. minimum section, the diameter of the nose and quill being 7½ in. The thrust is taken on roller bearings. The spindle is driven by means of a cross-arm in the housing on top of the gear. The length of this arm is about three times the diameter of the spindle, and it is provided with broad bearing surfaces which work in the vertical grooves on either side of the housing. This construction is adopted to avoid the excessive friction occasioned by a feather drive in the hub of the driving gear. The cross-arm drive eliminates the cramping due to torsional strains in the spindle and decreases the frictional pressure by distributing it equally between two surfaces, which are nearly three times the distance from the center. It also increases by 100 per cent. the area of the bearing surface.

The entire train of gearing is very heavy: all pinions and bevel gears, and worms and worm gears are of steel. The main driving gear is a spur gear. It is 28 in. in diameter, 4 in. face and ½ in. pitch. Triple back gears are provided, giving, with the four steps on the cone pulley, 12 changes of speed. The ratio of gearing with the triple back gears is 1 to 82, not including the cone pulley. The spindle speeds, 12 in number, vary from 2 r.p.m. to 45 r.p.m. There are six belt feeds for each spindle speed, varying from .054 in. to .003 in., and used for heavy facing. In addition to the belt feeds the machine is provided with a positive-geared feed, which by means of change gears will give any feed from .07 in. to ¼ in. These are so arranged that a positive lead of the spindle corresponding to any number of threads from 4 to 14 may be obtained for tapping. The vertical travel of the spindle is made either 14 in. or 20 in. It is counterbalanced, and in addition to the geared and belt feeds is provided with lever feed, hand-worm feed, and automatic stop. The distance from center of spindle to the column is 22 in.

The machine is also provided with a compound table 30 in. x 36 in., which is placed on the regular table. It enables work to be chucked readily, as it may be set approximately in position and clamped down securely; then by means of the table screws, it is brought easily and quickly in line with the spindle or boring bar. The compound table is also useful in heavy facing where it is necessary to get under the scale. It has a right and left

adjustment of 20 in.; an in and out adjustment of 14 in., and although not designed for a milling machine, the tool may be used as such to advantage in many places.

These machines are made by Baker Brothers, Toledo, Ohio.

Grab-Irons on Locomotive Front Ends.

The time allowed the railroads for complying with the amendment to the safety appliances acts requiring the application of grab-irons to locomotive front ends has been extended to March 1, 1904. The September Proceedings of the Western Railway Club contain some interesting

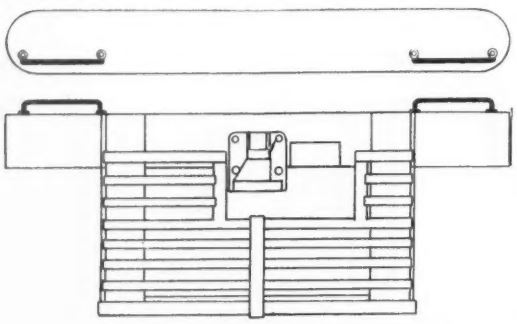


Fig. 1.

discussion from which it appears that in many quarters doubt exists as to what is required to comply with the law. Also there were suggestions looking to the formulating of a standard practice covering the application of these grab-irons.

Accompanying the discussion were drawings showing the methods adopted on several of the important western roads to comply with the requirements of the law. The drawings for the front ends, or pilots, are reproduced. Fig. 1 shows the method adopted for the Santa Fe System. In a letter accompanying the drawings Mr. Lovell, Assistant Superintendent of Motive Power, says: It is the view of the management of our road that grab-irons on the fronts of engines are an element of danger instead of safety, as they have a tendency to induce brakemen and others to walk in front of engines when they would not do so if the grab-iron was not there. We do not have steps on the pilots of our road engines, and we object to them on the same grounds as the grab-irons, that they would have a tendency to induce employees to go in front

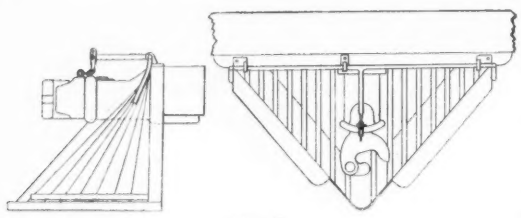


Fig. 2.

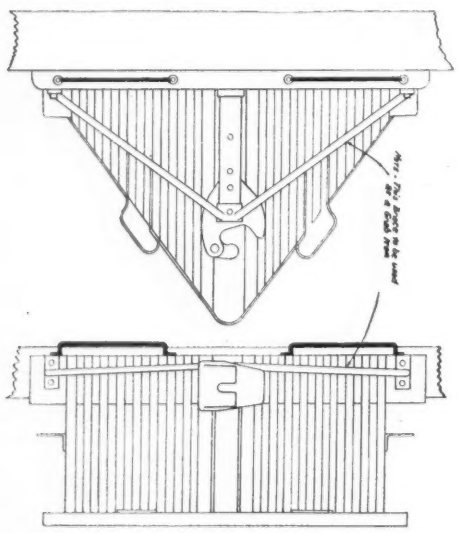


Fig. 3.

of the engines and upon the pilots. The law requires grab-irons, and we consider that the arrangement shown by our drawing, enclosed herewith, will fill the requirements of the law.

The Duluth & Iron Range has applied uncoupling levers to its pilot couplers, as shown in Fig. 2. Mr. H. S. Bryan, Master Mechanic, writes: The uncoupling levers are intended for, and used as, grab-irons on fronts of engines and rear of tenders, as well as for uncoupling levers. Since adopting this as a standard, we were assured by one of the inspectors for the Interstate Commerce Commission that it filled all requirements as a grab-iron on fronts of engines and rear of tenders.

The arrangement at present in use on the Vandalia Line is shown in Fig. 3. It is only temporary, however, and in adopting a standard the road intends being governed as far as practicable by the Pennsylvania Lines' standard.

Chicago & North Western practice is shown in Fig. 4. In his discussion of the matter at the club meeting Mr. Quayle, Superintendent of Motive Power, said: On our switch engines equipped with the ordinary uncoupling rod the switchmen take off these rods and throw them around the yard; the next time the engine comes to the

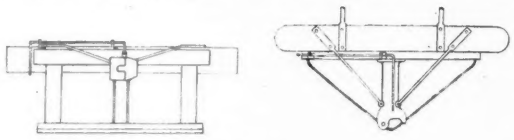


Fig. 4.

shop one is put on, but it is not long till it is gone again. We have a short stub pilot on our locomotives, the automatic coupler attached to it, and two angle braces, one on each side, that run almost parallel with the base of the pilot. The foot-board of the pilot projects out about 5½ in. from the outside of the slats, giving a place for a man to rest his foot, and this brace parallel to the base of the pilot gives him something to hold on to. We have no grab-iron other than that and we think it is not necessary to have others. We try to discourage our men, as far as practicable, from riding on the pilots.

Fig. 5 shows the arrangement on Chicago, Rock Island & Pacific locomotives. Mr. Barnum, Superintendent of

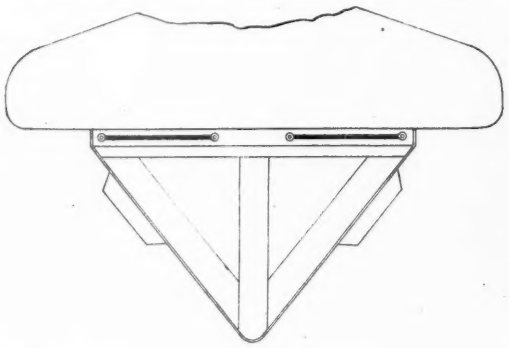


Fig. 5.

Motive Power, said in part: We have come to the conclusion that these devices will add nothing whatever to the safety of enginemen or trainmen in service. If we apply them, it will simply be to comply with the law and not because we think them actually necessary as a means of increasing the safety of our employees.

The Roadmasters' Convention.

The 21st annual convention of the Roadmasters' and Maintenance of Way Association was held at Kansas City, October 13, 14 and 15.

The first paper,* "Best Method of Maintaining Line Surface and Gage," was read by the author, Mr. C. Linehan (C., R. I. & P.). Mr. C. F. Blue (M. & O.) thought that the banks should be drained not less than 18 in. below the ballast in cuts. Mr. C. E. Jones (C., B. & Q.) did not favor the use of clay ballast as it grinds up and forms a paste when wet. Mr. T. Hickey (Michigan Central) said that the banks should be uniform before ballast is put on and the shoulders should also be uniform. Good track should have 18 in. of ballast from the base of the rail. Mr. C. Buhrer (Lake Shore) described the American rail loader and unloading machine, the Torrey ballast loader, the weed burning car of the C., M. & St. P., offset or connecting splices and the Laas anti-rail creeper.

An interesting talk on the "Preservation of Timber" was given by Dr. Hermann von Schrenk, of the United States Bureau of Forestry. The important features to be observed in increasing the life of ties are: (1) Make the ties last longer by preventing decay; (2) make them stronger. In order to make any preservative treatment effective, it is necessary to thoroughly dry and season the timber prior to treatment and then correctly pile it. European roads carry large supplies of timber on hand so that seasoned wood is always available. He also referred to other European practices such as the use of S irons in the ends of ties to prevent checking, the use of poplar tie plates as a cushion to the rail and the use of lag screws instead of spikes.. The poplar tie plates last about two years and cost one-eighth of a cent. In Europe ties are rarely removed for rotting, and he had seen ties that had been in the track for 33 years without signs of decay. He thought that there will be an agitation against the use of soft woods such as red oak, etc., and that future preservative processes will use a combination of zinc-chloride and creosote.

The paper by Mr. J. M. Meade (A., T. & S. F.), on "Track Drainage and Tiling," brought forth considerable discussion regarding the functions of porous and glazed tiles. Some thought that the water entered the tile chiefly through the open joints, while others maintained that the porosity of the tile was equally important. Mr. J. C. Burke thought glazed tile was better than the porous tile because it was less likely to break. He had recently used it on several miles of track, the tile being laid in a board trough with branches running out every 50 ft. The ditches were filled with cinders. A special type of auger was used in boring the hole through the bank.

The next report was on "Wooden, Metal and Composition Ties, Tie Plates and Preservation of Ties," by J. E. McNeil, J. B. Dickson, W. M. Camp and E. E. R. Tratman. A supplementary report on "The Railway Tie Situation in the United States," was read by Mr. Tratman. Mr. Wm. Goldie (Dilworth, Porter & Company) told of some observations in Europe, and thought that the wooden tie should not be discarded until absolutely necessary. A serious defect of the metal tie is the necessity for a rigid fastening between the rail and the tie. The reason that the spike has remained the favorite means of fastening is that it automatically adjusts itself to the surface of the track, and its form gives equal holding power in all directions. In France the spike is used on the inside and a lag screw on the outside of the rail. Mr. Buhrer read a letter from Mr. G. W. Rhodes (B. & M. R.) in which it was said that the zinc-chloride process is unsatisfactory where the drainage is poor, due to the rapid leaching out of the salts. Mr. Meade called attention to the fact that the zinc-tannin method closed the pores of the wood and prevented water from entering the heart.

Mr. McEniry (B. C. R. & N.) did not agree with the statement in the report regarding the life of treated ties on the Rock Island. He had seen treated hemlock ties in bad condition after four or five years' service. Green ties should not be treated with the bark on.

A roadmaster on the Rock Island said that treated ties lasted longer in wet soil than in dry soil, as the dryness caused dry rot.

Mr. Morrison (Cambria Steel Company) said that the experimental metal ties which had been put in the New York Central track were taken out because they ground the ballast to a powder.

Mr. Buhrer described his concrete-steel tie and read a letter from Mr. F. M. Phillabaum (Lakeside & Marblehead) which said that the 500 concrete ties in the 14 degree curve at Danbury, Ohio, were giving satisfaction.

Papers were read on "General Track Work," by A. Morrison; "Track Tools—Their Use and Abuse," by J. C. Rockhold; "Machine Ditching," by A. L. Meade and R. Stanley, and "Creeping of Rails," by F. J. Allen, after which the convention adjourned.

The following officers were elected for the ensuing year: President, J. A. Kerwin (M., K. & T.); First Vice-President, C. F. Blue (M. & O.); Second Vice-President, T. S. Cafferty (Santa Fe); Secretary and Treasurer, J. C. Rockhold (Santa Fe); Member of Executive Committee, J. L. Single (Long Island).

The convention next year will be held at St. Louis.

The Road and Track Supply Association elected the following officers: President, J. H. Martin (Hussey-Binns Shovel Company); Vice-President, J. A. Brown (Pocket List of Railroad Officials); Secretary and Treasurer, J. N. Reynolds (Railway Age); Executive Committee, F. A. Ingalls (Buda Foundry & Manufacturing Company), Wm. Goldie, Sr. (Dilworth, Porter & Company), W. E. Clark (Continuous Rail Joint Company), R. L. Thomas (National Lock Washer Company), H. Elliot (Elliot Frog & Switch Company), F. A. Poor (Weber Railway Joint Manufacturing Company).

The exhibits at the convention were as follows:

Adams & Westlake Company, Chicago.—Samples of "Adlake" long time burners and signal lamps.

American Valve & Meter Company, Cincinnati.—Full size "Little Giant" switch stand and catalogues of the "Poage" water column.

Atlas Railway Supply Company, Chicago.—Complete line of "Atlas" braces, tie plates, step joints, insulated joints and straight track joints.

Belding-Hall Manufacturing Company, Chicago.—Combination nut lock and washer.

Buda Foundry & Manufacturing Company, Chicago.—Descriptive matter of semaphore switch stands, Buda derail, railroad gates and Paulus and Wilson track drills.

Butler Foundry & Machine Company, Butler, Pa.—Full size model and photographs of McCool boltless rail joint.

C. Buhrer, Sandusky, Ohio.—Section of rail showing Phillabaum guard rail clamp.

Cambria Steel Company, Johnstown, Pa.—Sample and blue prints of 100 per cent. rail joint.

Chicago Pneumatic Tool Company, Chicago—Catalogues and blue prints of pneumatic tools and appliances.

Climax Supply Company, Chicago.—Climax fence post and sign posts, Climax vitrified clay cattle guards and photographs and models of the Union Drop Forge Company's spike puller and the Edgar car lock and seal.

Continuous Rail Joint Company of American, Newark, N. J.—Samples of rail joints.

Coughlin-Sanford Switch Company, New York.—Model of Coughlin-Sanford swing rail frog, automatic detector switch lock and Coughlin duplex switch stand.

W. S. Dickey Clay Manufacturing Company, Kansas City.—Specimens of railroad culvert and sewer pipe and drain tiles.

Dilworth, Porter & Company, Pittsburg.—Descriptive matter and samples of Goldie tie plates, "Goldie Perfect" spikes and Glendon tie plates.

Elliot Frog & Switch Company, East St. Louis, Ill.—Models of Hasty three throw switch and Eureka spring rail frog.

Evens & Howard Fire Brick Company, St. Louis, Mo.—Specimens of vitrified culvert pipe.

Fairbanks, Morse & Co., Chicago.—Full line of truck tools, motor cars, hand cars, push cars and velocipedes.

Foster Car Replacer & Supply Company, Chicago.—Samples, model, photographs and descriptive matter of the Foster car and engine replacer.

Wm. Goldie, Jr., & Co., Pittsburg.—Samples of "Goldie Perfect" tie plug.

Hussey, Binns Shovel Company, Pittsburg.—Samples of

*Abstracts of this and other papers are given elsewhere in this issue.

track and locomotive shovels and scoops for handling stone ballast.

Independent Railroad Supply Company, Chicago.—Wolhaupter standard tie plate, Wolhaupter "C" rail joint, "Chicago" 4-flange tie plates and "Federal" single flange tie plates.

International Creosoting & Construction Company, Galveston, Texas.—Samples of treated ties and piling.

International Fence & Fireproofing Company, Columbus, Ohio.—Samples, blue prints and descriptive matter of "International" wire fences and gates and the International fireproofing system.

Kansas City Bolt & Nut Company, Kansas City.—Samples of Harvey grip track bolts, nuts, spikes, etc.

Kenyon & King, South Omaha, Neb.—Sample and photographs of car blocker and derailer.

Laas & Sponenburg Company, Elgin, Ill.—Samples of joint tie holder and anti-rail creeper.

A. Leschen & Sons Rope Company, St. Louis.—Samples and descriptive matter of "Hercules" switch and wrecking ropes and ballast unloaders.

D. H. Mahoney, Vincennes, Ind.—Model of Mahoney railroad ditching and excavating machine.

Charles Morrill, New York.—The "Pearson Cyclone" spike puller.

National Lock Washer Company, Newark, N. J.—Samples of the National lock washers.

Parker Cattle Guard Company, New Orleans, La.—Model of the Parker cattle guard.

Pettibone, Mulliken & Company, Chicago.—Descriptive matter of roller rail bender and straightener, "Strom" clamp frogs and other track equipment.

Railroad Supply Company, Chicago.—Samples and small souvenir models of Wolhaupter and Q. & W. tie plates.

Railway Appliances Company, Chicago.—Q. & C. Samson rail bender, Bryant rail saw, Fewing's car and engine replacer, Q. & C. rail drill and Q. & C.-Bonzano rail joint models.

Ramapo Iron Works, Hillburn, N. Y.—Models of automatic safety switch and stand and MacPherson's patent safety switch and frog.

Republic Railway Appliance Company, St. Louis.—Samples of the Hart tie plate.

Spencer Otis Company, Chicago.—Samples of Hart tie plates and photographs of National coal side dump cars.

Wallace Cattle Guard Manufacturing Company., Monroe, Ark.—Model of Wallace surface cattle guard.

Weber Railway Joint Manufacturing Company, New York. Samples of Weber joints.

Purifying Water for Locomotives.

Some interesting figures on the cost of purifying water for locomotive use are given in the committee report on this subject to the Association of Railway Superintendents of Bridges and Buildings. Out of 25 roads answering the circular of inquiry of the committee, nine have purifying plants in use, and two report having them in contemplation. In addition to giving the replies from the roads having the plants, the report reproduces the paper describing the Chicago & North Western's method of purification presented to the Western Railway Club February, 1903, by Mr. G. M. Davidson, Chemist and Engineer of Tests of the road. An illustrated abstract of this paper was published in the *Railroad Gazette* of February 27th.

Mr. Davidson furnishes the committee some figures on the cost of operating 16 purifying plants on the North Western during July, of this year. The statement gives in detail the cost of pumping water without softening, and the cost of softening. The former ranges from 1.59 to 8.17 cents per 1,000 gals., and the latter from .73 to 6.33 cents per 1,000 gals., for the different stations. The cost of chemicals ranged from .47 to 6.94 cents per 1,000 gals.

The Union Pacific has 11 Kennicott softeners varying in capacity from 8,000 to 20,000 gals. per hour. Twenty-five more are being erected at the rate of three per month. An interesting statement accompanies this communication, giving analyses of the waters before and after treatment, in grains per 1,000 gals., and pounds of incrusting solids removed daily at each plant. The cost of chemicals varies from 0.3 to 3.6 cents per 1,000 gals. The 10 plants now in operation treat 1,441,000 gals. per day at an average cost of 1⅛ cents per 1,000 gals. Chief Engineer Berry, who writes the communication, says: "The saving in boiler repairs certainly warrants the expenditure of the amount necessary to treat the waters at all points where we either have, or are erecting, softeners. Another saving is in locomotive fuel, which will be no small item. . . . Referring to the table again, you will note that in the 10 plants we are removing 2,790 lbs. of solids per day. Cost of chemicals for this work is 58¼ cents per 100 lbs. of incrusting solids removed. Even though this figure were doubled, it would still be an economy, as any experienced man knows that 100 lbs. of scale cannot be removed from boilers for any such figure."

Mr. E. J. Yard, Chief Engineer of the Denver & Rio Grande, says: We have three purifying plants in use on this system. Two were put in by the Industrial Company—one at Ruby and one at Helper, and one by the Tweeddale Company at Thompson's Springs. The estimated cost of chemicals per 1,000 gals. at Ruby and Helper is approximately 1 cent; the cost for operating the plant, including labor and chemicals, averages about 4 cents. The cost of the chemicals per 1,000 gals. of water treated at Thompson's by the Tweeddale system is 7.6 cents; labor, fuel and incidentals bring up the total cost of treatment to 11½ cents.

The Pennsylvania Lines West of Pittsburg report two plants, put in by the Industrial Company at Washington and Middlepoint, Ohio, respectively, and in service since June. A description of the Middlepoint plant, with an analysis of the water treated, was given in the *Railroad Gazette* Oct. 2.

The figures for Washington are: Total cost per 1,000 gals. 2.238 cents; average scale-forming material in raw water, 29.04; average degree of hardness of treated water, 4.97. For Middlepoint: Total cost per 1,000 gals. 6.052 cents; average scale-forming material in raw water, 54.17; average degree of hardness of treated water, 5.98.

The Chicago & Alton reports a Wefugo plant at Bloomington, Ill., the estimated cost per 1,000 gals. at which is about 6 cents.

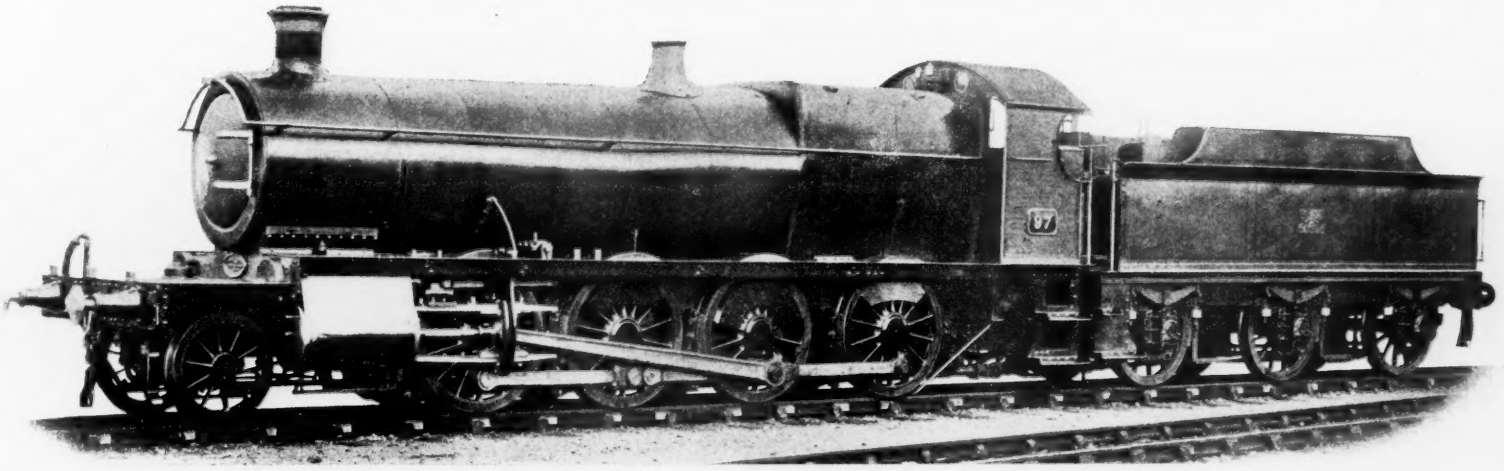
The Chicago, St. Paul, Minneapolis & Omaha has four Helwig and one Kennicott softener. The average cost for chemicals per 1,000 gals. is given at 3 cents.

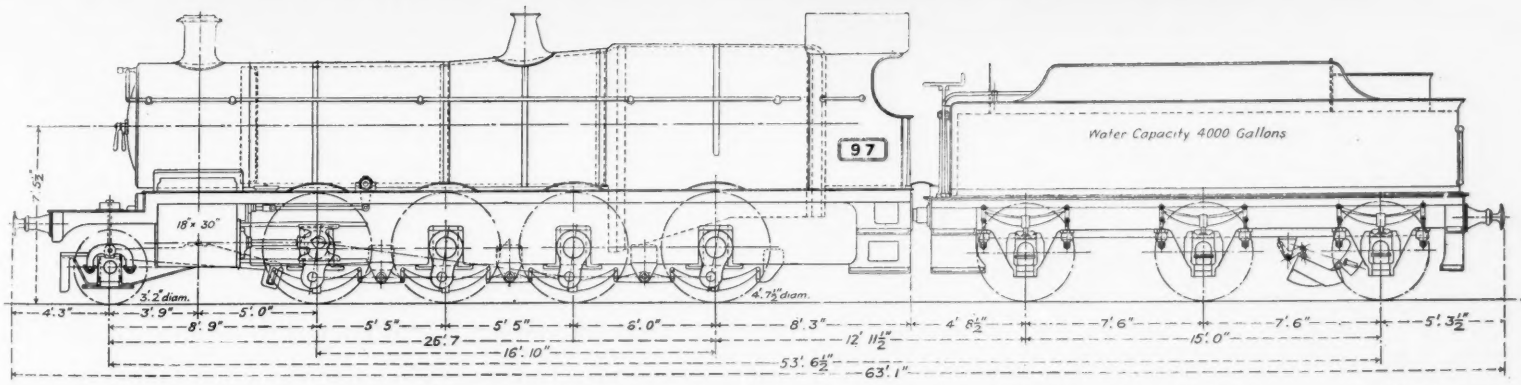
The committee asked for figures on saving in cost of repairs to locomotive boilers. In concluding, the report says: The exact saving in cost of repairs to locomotive boilers is still undetermined as plants on American railroads have not been in use long enough for statistics of this nature to have been compiled. European railroads have been purifying water for locomotive use for many years and the fact that more water-purifying plants are being installed each year on European railroads is proof of the benefit derived from purifying water for locomotive use.

The report is signed by R. C. Sattley, Chairman.

Consolidation (2-8-0) Locomotive For the Great Western of England.

The accompanying engravings, reproduced from the *Railway Engineer*, show a heavy consolidation (2-8-0) locomotive for the Great Western, designed by Mr. G. J. Churchward, Chief Locomotive, Carriage and Wagon Superintendent of that road. It is intended to haul heavy mineral trains, and is the first consolidation built for English traffic. In many ways it closely resembles American practice for engines of this type. It has 55½-in. drivers, outside cylinders, solid-end connecting and side rods, and all wheels are flanged. The cylinders are 18 in. x 30 in., set horizontal but about 3 in. above the center of the driving wheels. Both in proportions and position of the cylinders, this engine differs from American engines of the same class. The long stroke—30 in.—and the corresponding long crank, with the small drivers, gives a maximum rotation effort for a given crank pin effort. All of the wheels are equalized with under-hung springs and levers. The engine has piston valves actuated by a bell crank and rocker arm which extends outside the frames. The valve stem has a small cross-head bearing on a guide bolted to the top bar of the piston cross-head guide. In point of weight it is one of the largest engines in England, having a weight on drivers of 137,760 lbs. and a tractive effort of 31,524 lbs. Some of the principal dimensions follow:





15232 lbs. *24640 lbs.* *39200 lbs.* *40320 lbs.* *33600 lbs.* *32816 lbs.* *31868 lbs.* *32032 lbs.*

Consolidation (2-8-0) Locomotive for the Great Western.

Kind of fuel to be used	Bituminous coal.
Weight on drivers	137,760 lbs.
Weight on truck wheels	15,232 lbs.
Weight, total	152,992 lbs.
Weight tender, loaded	96,656 lbs.
General Dimensions.	
Wheel-base, total, of engine	25 ft. 7 in.
Wheel-base, driving	16 ft. 10 in.
Wheel-base, total (engine and tender)	53 ft. 6½ in.
Height, center of boiler above rails	7 ft. 5½ in.
Heating surface, fire-box	154.39 sq. ft.
Heating surface, tubes	1988.65 sq. ft.
Heating surface, total	2143.04 sq. ft.
Grate area	27.22 sq. ft.
Wheels.	
Drivers, number	8
Drivers, diameter	55½ in.
Truck wheels, diameter	38 in.
Cylinders.	
Cylinders, diameter	18 in.
Piston, stroke	30 in.
Steam ports	27⅝ in. x 1¾ in.
Exhaust ports	27⅝ in. x 4¼ in.
Boiler.	
Type	Belpaire
Working steam pressure	200 lbs.
Diameter of barrel	58¾ in.
Fire-box.	
Length	8 ft. 2 3/16 in.

Width	4 ft. 9 in.
Depth, front	6 ft. 6 7/16 in.
Depth, back	5 ft. 7/16 in.
Tubes.	
Number	250
Diameter	2 in.
Length	15 ft. 2 5/16 in.
Typical Ratios.	
Tractive force	31,524 lbs.
Weight on drivers divided by max. tractive effort	4.37
Weight on drivers divided by total heating surface	64.3
Heating surface divided by grate area	78.7
Tube surface divided by fire-box heating surface	12.8

Ties and Tie Plates.*

At the present rate of consumption and destruction of timber, it is estimated that the supply will be practically exhausted in 30 or 40 years. The supply and cost of wooden ties in the future involves a study of the available timber in sight, and the annual consumption and production of new timber. If the present demand and consumption continue, it is evident that some measures must be taken to reduce the demand, or increase the life of ties.

Metal tie plates are one of these improvements. They protect the timber from rail cutting and enable the ties to remain in service in the track during their natural life, or until rendered worthless by decay, except when they are injured by the spikes. This spike-killing, however, can only be entirely prevented by the use of some improved fastening, which has not yet been introduced.

The Atchison, Topeka & Santa Fe began the use of treated ties early in 1885. The experience of this road has shown that mountain pine ties, which in the natural condition of the timber are short lived, can be made serviceable and durable by chemical treatment. The natural life of this timber for ties is only four or five years in New Mexico and Arizona, but by treating with zinc-chloride the average life has been increased to over 11 years for seven divisions of the road, and to 12 years on the Rio Grande division; or from two and a half to three times the life of the untreated tie. The experience of the Southern Pacific, on both the Atlantic and Pacific systems of that road since 1887, has been likewise satisfactory. On the Chicago, Rock Island & Pacific treated hemlock ties have been in use since 1887, with satisfactory results, and the records show that the life of the natural timber has been increased two to three times by chemical treatment.

At the present time the following roads are using treated ties: The Gulf, Colorado & Santa Fe; the Chicago & Eastern Illinois; the Burlington & Missouri River; the Great Northern; the Missouri, Kansas & Texas; the Chicago & North Western; the Chicago, Rock Island & Pacific; the Union Pacific; the Oregon Short Line; the Illinois Central, and the Mexican Central.

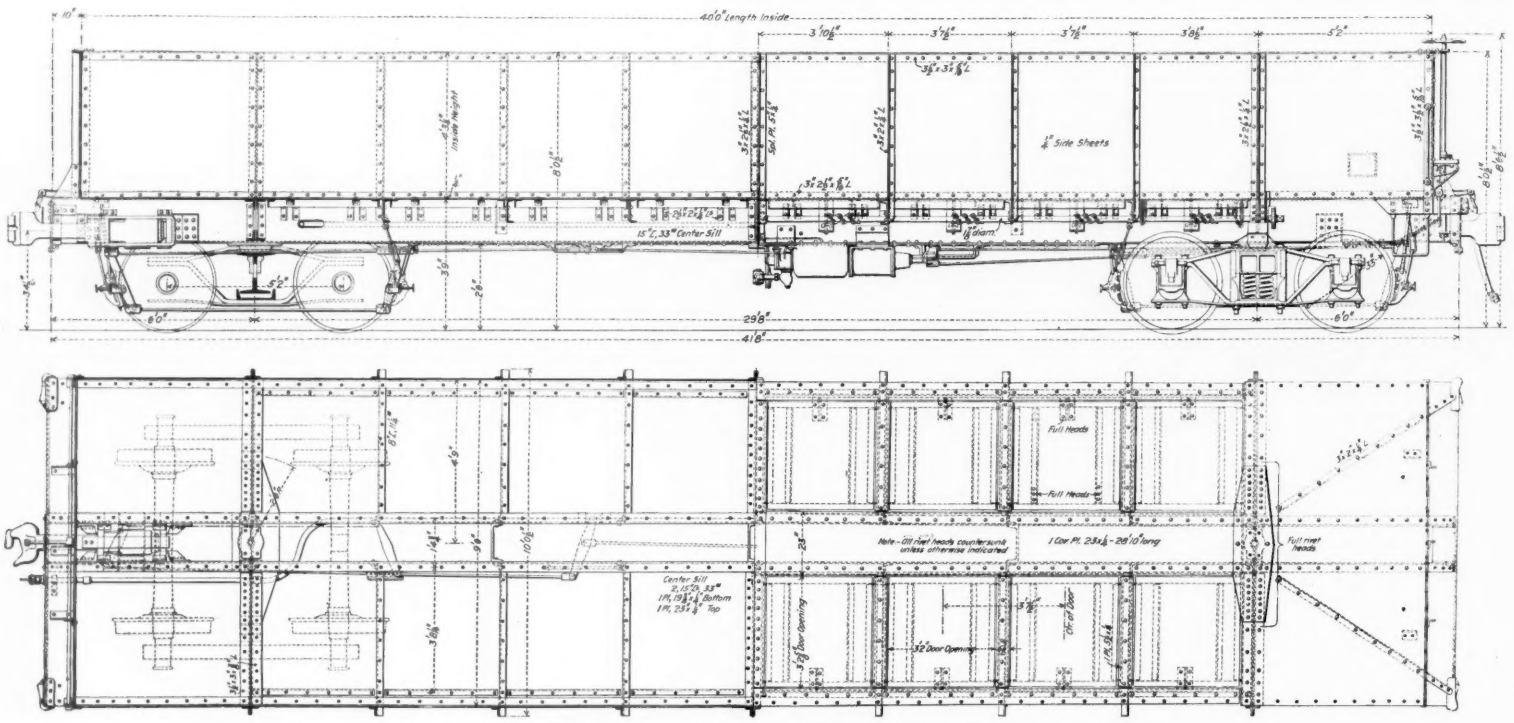
Another important factor in prolonging the life of treated and untreated ties is their seasoning. We believe that managers will find it a profitable investment to have all ties thoroughly seasoned before permitting them to be laid in the track.

At the present time three different lines of improvement in the production and use of ties are being followed or experimented with: First, the treatment of wooden ties with chemical preservatives; second, the use of ties made entirely of steel, and, third, the use of ties made of concrete reinforced with steel members embedded in the body of the tie. For the present the status of the steel market is an important factor in any question as to the use of all metal ties, and there seems to be little probability of their introduction. The chemical preservation of wooden ties and the use of reinforced concrete ties appear just now to be the most promising. Where the conditions of supply are such that wooden ties can still be obtained in desirable quantity and at reasonable cost, we would recommend treating with some of the processes using chloride of zinc. This may well be applied to the cheaper timbers which are of little use as ties unless treated. It would seem also that experiments with reinforced concrete ties may be undertaken with hope of success and ultimate economy.

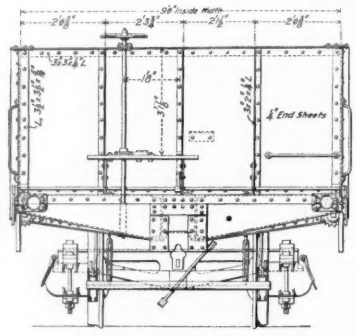
*Abstract of a report presented to the Roadmasters' and Maintenance of Way Association, October, 1903, by Messrs. J. E. McNeil, J. B. Dickson, W. M. Camp and E. E. R. Tratman.

Cambria Cars With Caswell Drop Doors for the Burlington.

In the *Railroad Gazette* of Oct. 16 there was illustrated and described a 50-ton steel underframe gondola with Caswell drop doors and wooden sides, ends and floor, one of a lot of 1,000 recently built by the Standard Steel Car Company for the Chicago, Burlington & Quincy. The accompanying engravings show a similar car, one of another thousand cars for the same road to be made by the Cambria Steel Co. The general dimensions of both cars are the same, but those built by the Cambria Steel Co. are entirely of steel. The door-operating mechanism is also different on the two cars, that on the Cambria cars consisting of a longitudinal shaft on each side of the car, around which is wound a chain for closing each door, much the same as the door-operating mechanism on drop-bottom or hopper-bottom gondolas of the usual type.



Plan and Elevation of 100,000 lb. Steel Gondola with Caswell Drop Doors for the Burlington.



End Elevation.

The main part of the load in the Cambria cars is carried on two 15-in., 33-lb., channel center sills, spaced 12 in. apart. These are tied together with ¼-in. top and bottom cover plates. The bolster and end sill are both built up of plates and angles and are built around the center sills which are continuous, no spliced draft sills being used. The sides, ends and floor are ¼-in. plates and 3-in. x 2-in. x ¼-in. angles, riveted to the cross ties at each door are used as side stakes. These cross ties are 8-in., 11¼-lb. channels, and they form the framework for the door openings. They do not pass through the center sills but are riveted to them with angles. There are no side sills, the load at the edge of the car being carried by the sides, which when strengthened at their top and bottom edges with heavy angles form deep plate girders supported at the bolsters and end sills.

The floor of the car between bolsters is made up of eight doors on each side of the center sills, hinged next to the center sills and dropping down from the sides of the car. The door openings are 3 ft. 2⅝ in. x 3 ft. 2 in. Angles are used to reinforce the doors around all four edges, and the operating chains are fastened to brackets riveted to the bottom side. The door shaft is 1⅞ in. in diameter and extends just outside the bolsters, where there is the usual ratchet wheel and dog and a square end for the crank. It is placed just inside the edge of the car and passes through all of the channel cross ties as shown in the side and end elevations.

These cars, like those built by the Standard Steel Car Co., are equipped part with Miner and part with Westinghouse friction draft gears and Commonwealth truck bolsters.

Trade Union Outrages in September.

The following list is selected and abbreviated from the accounts published in the daily papers at the places and times of occurrence:

Rochester, N. Y., Sept. 1.—The Davis Machine Company offers reward for the arrest of the man who assaulted Jacob Simon, a non-unionist employee.

Kansas City, Mo., Sept. 1.—George Humphrey, a non-union structural iron worker, is assaulted by union laborers while on his way home from work. One man leaps on his back, then four others assault him, when Humphrey draws a revolver.

Kansas City, Sept. 2.—Perry Sowers, a foreman of the Green Mountain Distilling Company, calls his brother, B. C. Sowers, a non-union boiler-maker, a scab, and finally engages him in a desperate fight, which is stopped by the police.

New York, Sept. 3.—James McShane and his wife stagger into Bellevue Hospital, both intoxicated, but carrying their two-year-old child. McShane says he has not done a stroke of work since the beginning of the truck drivers' strike, that he and his wife never drank anything before he quit work, but that it has been easier to get whisky than bread since then.

New York, Sept. 4.—John Fennberg, an iron worker opposed to the Sam Parks organization, is assaulted by James Burns, a walking delegate for the Housesmiths' and Bridgemen's union, and knocked down with a bludgeon. The new building of the Brooklyn *Daily Eagle*, upon which he was going to work, has been hampered by the labor union, the week before an attempt having been made to blow up a boiler in the cellar during the absence of the engineer.

Patrick Flood unable to get work because of a union ordered strike, is brought before Magistrate Barlow for stealing a loaf of bread which he had taken home to his starving wife and daughter. The facts in this pitiful case have been verified.

Buffalo, Sept. 5.—Three non-union employees of the Keystone Company are assaulted while returning to work by five men who were in hiding. They bombard the workmen with stones and sticks, and then strike them with their fists and kick them.

Grand Rapids, Mich., Sept. 7.—C. H. Bergner, who refused to join in a sympathetic strike of the carpenters and who works during their parade, is assaulted by a crowd of carpenters, who also resist the policemen who try to quell the disturbance.

Chicago, Ill., Sept. 7.—J. R. Thornton is pursued by a mob because he was driving a vehicle without having a union card in his possession, although he attempted to explain that the team belonged to him and that the wagon was empty; the frenzied mob cut his horses from the wagon and pelt both him and his horses with sticks and stones. Thornton says that his employees are all union men, and that he did not know he was violating any of the rules of the Teamsters' Union.

John Ryan, a teamster, is cut twice in the arm with a

razor by Benjamin Dyer while engaged in an altercation over labor matters.

C. P. Riedle, a non-union expressman, was pulled from his wagon and beaten and kicked until he was unconscious, despite the pleadings of his two little children, who tearfully begged the mob to desist.

The saloon of Jacob Berland was wrecked and his bartender's life threatened because he was not a member of the union. Several shots were fired at him.

Chicago, Sept. 8.—Two striking stokers creep through the engine room, reaching the fire room of the steamer Eastland shortly before the boat left its docks, and assault E. J. Hillman, the stoker, with pieces of coal, when he falls unconscious; his assailants escape.

Lincoln, Neb., Sept. 8.—Militiamen on guard at the Taylor & Brunton mine are attacked by striking workmen, who make their escape in the darkness.

Chicago, Sept. 9.—John M. Stiles, the painting contractor who filed suit asking $50,000 damages from the Painters' Union and the Associated Building Trades, asks an injunction restraining the unions from interfering with his employees and conspiring to ruin his business by strikes and boycotts. The petition alleges that his men were continually harassed and assaulted, and that he was obliged to give up important contracts.

Chicago, Sept. 10.—Striking candy workers under the leadership of H. N. Dietrich, a professional labor organizer and a strike agitator, follow a delivery wagon of the Berry Candy Company, grab the bridle of the horse, try to stop the wagon, and throw stones and missiles at the driver.

Lynn, Mass., Sept. 10.—A half-dozen members of the Boot and Shoe Workers, employed in the free factory of Morse & Logan, were set upon by a party of men who were lying in wait for them and were all severely beaten. George Brown was assaulted by six men, who knocked him down and kicked him about the body and head. Another man was rendered unconscious by a sledge-hammer blow on the side of the head.

New York, Sept. 10.—Robert Hamlin, a negro non-union driver, is struck over the head and severely cut by pieces of coal thrown at him by two striking coal drivers.

St. Joseph, Mo., Sept. 10.—A non-union driver of one of the Brown Transfer Company's wagons is rushed and roughly used by several hundred of the striking employees of the Nelson Morris packing plant.

Chicago, Sept. 11.—Fifty strikers at the Armour Glue Works attack non-union workmen on their way to work, and when policemen appear, assault them with bricks and clubs.

Philadelphia, Sept. 11.—Because of the loss of his position through the carriage builders' strike last spring, and his inability to obtain employment since that time, Frederick Miller commits suicide by leaping from a third-story window.

McKeesport, Sept. 12.—William Bliss, a Port Vue tinplate striker, while talking to a group of five strikers, announced that he intended going to work. One of the group dealt him a hard blow on the back of the neck, and he fell to the pavement with his neck broken, dying immediately.

Washington, D. C., Sept. 14.—Six hundred painters, paperhangers and decorators, while discussing a strike for higher wages, engage in a fight which brings out the police. William C. Mason, who with several other men leap from the second-story window of the painters' hall to escape from the melee, is sent to the hospital with a broken leg.

Philadelphia, Sept. 14.—John Burkhardt and Peter Lutman, striking dyers, are arrested for assaulting non-union employees of the Philadelphia Dye Works, and threatening to fix them so they could not work any more.

Brooklyn, Sept. 16.—Several negro workingmen, who had been secured to take the places of striking employees of the Export Lumber Company, are set upon by a mob of the strikers, who hoot and jeer at them and then assault them, causing a riot which is dispelled by the police.

St. Joseph, Sept. 17.—John E. Spillane, a non-union plumber, is assaulted by two union plumbers, who knock him twice to the ground.

New York, Sept. 18.—Thomas Gowan, a striking teamster who says that he was obliged to spend his last $4 to buy a hat, a belt and a cane for the Labor Day parade, is arrested while trying to steal door knobs, which he said he wanted to sell to obtain bread for his wife and children, who were starving. He said that he had been walking the streets day and night in the unsuccessful attempt to find employment, that friends had become tired of supplying his family with food, and that at the headquarters of the union he got promises only, although he told them that his wife and babes were starving. For three days they had subsisted upon a few crusts of bread and their cries for food rang in his ears until he determined to steal. Strange as it may seem, this story of the foolish Thomas proved, on investigation, to be quite true.

New York, Sept. 20.—George Carr, an iron worker, ordered on strike by Sam Parks and unable to obtain employment to support his dependent mother and sister, attempts suicide by drinking carbolic acid.

Frank Laecke is arraigned for threatening to kill James Galvin, a head sheetman in the book bindery of Wolfe & Sons, if he did not join the men who are on strike. Laecke was one of three men who assaulted Galvin but the other two escaped arrest.

Brooklyn, Sept. 21.—Striking employees of Menninger's bakery attack the non-union bakers who fill their places, and gathering in front of the bakery, endeavor to prevent customers from entering the shop.

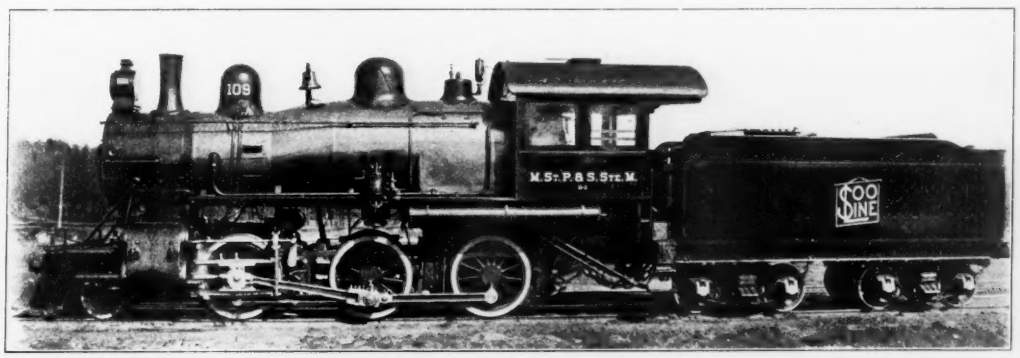
Chicago, Sept. 24.—John Wozna, who was employed a year ago by the Edward Hines Lumber Company, although not a member of a union, when a strike was called was annoyed and intimidated by the strikers and induced to join their ranks. Unable to obtain other employment when starvation threatened his wife and family, he returned to work, but on the way home was attacked by a crowd of strikers, knocked to the ground, beaten and kicked and struck with a brick in the back of the head. For months he lay helpless and suffering at the hospital, but when he apparently had recovered it was evident that he had become insane and was unable to work. He was finally committed to the Dunning Insane Asylum, the physicians saying that it was the brick that had made him insane.

Wheeling, W. Va., Sept. 28.—A non-union machinist employed at Rivedside Mills was attacked by a crowd of strike sympathizers and so stunned that he had to be assisted to his boarding house.

Class D2 Mogul (2-6-0) Locomotive for the "Soo Line."

The Minneapolis, St. Paul & Sault Ste. Marie put in service last spring three two-cylinder compound mogul (2-6-0) freight engines designed for use in North Dakota, where the water is bad. The roof sheet of the boiler is carried as high as possible in order to avoid trouble from foaming. The engines have given satisfaction, and the road is now receiving seven more of the same type from the builders—the Schenectady Works of the American Locomotive Company. A photograph of one of these engines is shown.

The high-pressure cylinder has a piston valve, and the low-pressure cylinder has the Allen-Richardson slide valve. The total weight of the engine is 148,000 lbs., and the weight on drivers is 125,000 lbs. The total heating surface in the boiler is 1,847.6 sq. ft., 7.6 per cent. of which is in the fire-box. The fire-box is wide and the grate area is 38.96 sq. ft., which is liberal for a boiler of that size.



Mogul (2-6-0) Two Cylinder Compound for the "Soo Line."

The cylinders are 21 in. and 32½ in. x 26 in., and the drivers are 55 in. in diameter. The driving wheel centers and the driving boxes are made of cast steel.

Some of the typical ratios are:

Weight on drivers divided by heating surface	67.6
Heating surface divided by grate area	47.4
Tube heating surface divided by fire-box surface	12.1
Steaming capacity*	.208

*For steaming capacity factor for compound locomotives see *Railroad Gazette*, June 19, 1903, p. 441.

A general description follows:

Fuel	Bituminous
Weight on drivers	125,000 lbs.
Weight on truck wheels	23,000 lbs.
Weight, total	148,000 lbs.
Weight, tender loaded	116,000 lbs.

General Dimensions.

Wheel-base, total, of engine	21 ft. 7 in.
Wheel-base, driving	14 ft.
Height of stack	14 ft. 9 in.
Heating surface, fire-box	141.51 sq. ft.
Heating surface, tubes	1706.1 sq. ft.
Heating surface, total	1847.6 sq. ft.
Grate area	38.96 sq. ft.

Wheels and Journals.

Drivers, number	6
Drivers, diameter	55 in.
Drivers, material of centers	Cast steel
Truck wheels, diameter	30 in.
Journals, driving axle, size	Main, 9½ in. x 10 in.
Main crank pin, size	6 in. x 6½ in.

Cylinders.

Diameter	21 in. and 32½ in.
Piston, stroke	26 in.
Piston rod, diameter	3½ in.
Kind of piston rod packing	Cast-iron rings
Steam ports (low pressure)	23 in. x 2⅛ in.
Exhaust ports (low pressure)	23 in. x 3 in.
Bridge, width (low pressure)	1⅜ in.

Valves.

Kind of	L. P., Allen-Richardson; H. P., piston
Greatest travel	6 in.
Outside lap	L. P., 7 in.; H. P., 1¼ in.
Inside clearance	L. P., ¼ in.; H. P., ⅛ in.
Lead in full gear	Line and line

Boiler.

Type	Extended wagon-top
Working steam pressure	200 lbs.
Material in barrel	Worth steel
Thickness of material in barrel	⅝ in.
Diameter of barrel	60¼ in.
Seams, kind of horizontal	Butt joint, sextuple riveted
Seams, kind of circumferential	Double riveted
Thickness of tube sheets	½ in.
Thickness of crown sheet	⅜ in.
Crown sheet stayed with	Radial stays

Fire-box.

Length	90⅛ in.
Width	62¼ in.
Depth, front	68 in.
Depth, back	55½ in.
Material	Carbon steel
Thickness of sheets	Sides, ⅜ in.; back, ⅜ in.
Water space, width:	Front, 4 in.; sides, 4 in. & 6 in.; back, 4 in.
Grate, kind of	Rocking

Tubes.

Number	266
Material	Charcoal iron, No. 11 B. W. G.
Outside diameter	2 in.
Length over sheets	12 ft. 4 in.

Other Parts.

Exhaust pipe	Single
Exhaust nozzles, diameter	4¾ in., 5 in., 5¼ in.
Stack	Taper
Stack, least diameter	14 in.
Stack, greatest diameter	16½ in.

Tender.

Style	Straight sides and collar
Water capacity	6,000 gals.
Coal capacity	10 tons
Type of underframe	10-in. steel channels
Type of truck	4-wheel
Diameter of truck wheels	33 in.
Diameter and length of axle journals	5½ in. x 10 in.
Wheel-base	17 ft. 2 in.

Annual Inspection of Bridges and Culverts.

The conclusions of the committee of the Association of Railway Superintendents of Bridges and Buildings, on the best method of making annual inspection of bridges and culverts, and form of report to be made, are given below. In response to a circular of inquiry sent out the committee received 83 replies, the more important of which are given in an appendix to the report. The committee also had nearly 200 forms, and data covering the inspection methods in use on 60 railroads. The appendix contains a tabulation of these inspection methods. The conclusions the committee draws in summing up its elaborate report are as follows:

There should be a clear distinction made between Current Inspection and General Inspection.

The purpose of the current inspection is to keep the structure in safe condition, to promptly discover any defects, and to report same promptly so that repairs can be made before the safety of the structure is affected. It is important that a simple record should be made while at the bridge and the superior officer kept advised of all such inspections promptly, whether made by a bridge mechanic, gang foreman, or division bridge inspector.

The purpose of the general inspection, frequently called the annual inspection, although in many cases conducted semi-annually, or even quarterly, is not only to check the maintenance work of the division organization, but to make a more careful investigation of important bridges, to make suitable record of the general condition of all bridges and structures on the entire road, and further to ascertain and settle what extensive special repair or renewal work should be done in the following working season.

The current inspection should not be done in a haphazard or intermittent manner, but should devolve on one or more experienced and trained bridgemen whose duty it should be to follow up the current bridge inspection along a certain prescribed programme which would vary according to the local conditions on each road. Whoever has general charge of bridge maintenance on the division or district should watch the current bridge inspection reports and act promptly on receipt of same, according to the emergency. He will necessarily, in important cases, make a personal supplementary examination and must keep himself advised at all times of the general condition of all bridges and structures under his control by frequent inspection trips over his territory.

The committee recommends for recording the current inspection either a blank book, supplemented by typewritten reports, or forms presented with the report called the "Current Bridge Inspection Report" and the "Summary Current Bridge Inspection Report." For use of the general inspection the committee recommends a form known as the "General Bridge Inspection Report."

The committee further recommends that the regular bridge department should be responsible for and hence

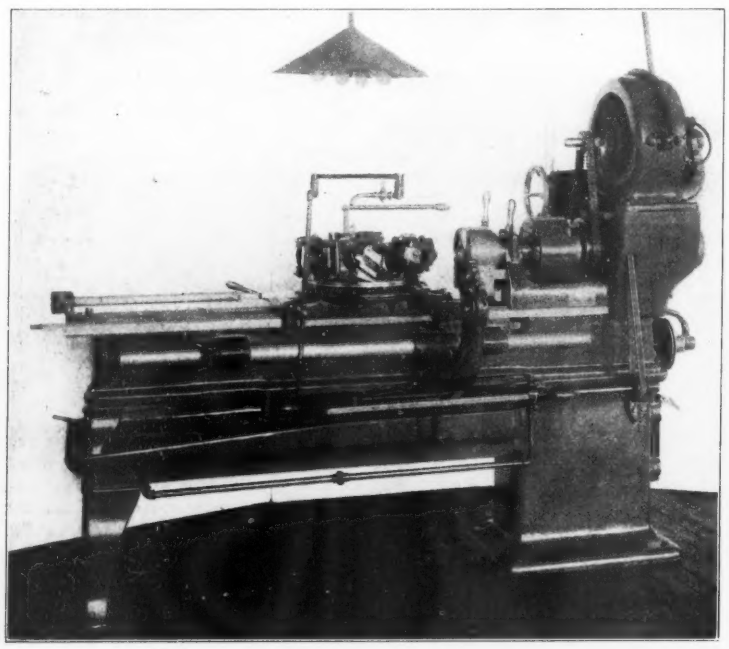
should inspect and report on all bridges, culverts, masonry, and foundations, without placing direct responsibility on the track department. This, however, should not exclude the track department from watching all such structures in a general way and the obligation to report promptly any unusual signs of defects or trouble, and to take such necessary steps as the emergency may require, more particularly in connection with the waterway opening, condition immediately after high water, burnouts, damage done by accidents or casualties of any kind, etc. The track department should be responsible, however, for keeping waterways clear, bridge seats clean, extinguishing fires, keeping small drains open, and the track in proper shape at the runoff at each end of a bridge and on the bridge, using when necessary temporary shims on the bridge ties.

The report is signed by Walter G. Berg, Chairman; J. A. Dodson, C. F. Loweth, Arthur Montzheimer, A. Zimmerman, A. Shane, I. O. Walker.

A Motor-Driven Turret Lathe.

The engraving shows a Hartness flat turret lathe driven by a Crocker-Wheeler, Form F motor. It is a machine for doing general lathe work, in sizes not exceeding 2 in. in diameter and 24 in. long; hence it is called a 2-in. x 24-in. lathe, although with special appliances it may be fitted to take bar stock as long as 36 in., or chucked work up to 14 in., and even to 16 in. in diameter. The maximum economy possible from its use is realized when turning quantities of identical pieces. On such work it is usually allowable to make the limit of variation each way from nominal size .0005 in. to .001 in., but at a sacrifice of output it is possible to work as close as .00025 in.

Among the distinguishing features of the lathe are the peculiar form of the turret, independent feed stop for each



Hartness Motor-Driven Turret Lathe.

position, roller feed for advancing the work at the end of each cycle, and a swinging die carrier. The turret is a flat circular plate mounted on a low carriage containing the controlling mechanism. Its power feed is actuated by a worm screw which may be disengaged by an adjustable stop for each individual position. In operation, as soon as the turret clears the work on its backward travel, it is automatically revolved to the next position; or by an arrangement of trip-screws near the center of the plate, it may be caused to turn through three, four or five of its six positions before stopping. The roller feed is mounted on the outside of the headstock and pushes the bar of work through the hollow spindle and chuck until it strikes a stop on the turret carriage. The rolls then slip until the chuck is closed, as they are started and stopped by the same lever that opens and closes the chuck. With the latter is provided a set of interchangeable jaws to take all shapes and sizes of rough stock between 2 in. and ⅜ in. The die carrier is mounted on a sliding bar on the back of the frame and arranged to swing into working position. It holds a die of any kind and a pointer for shaping the ends of shafts and bolts, or reducing stock. In this way two extra operations, or eight in all, are made possible to the one lathe.

The head stock is substantial, strong and rigid. The motor has a capacity of 5 h.p. at 1,100 r.p.m. and 240 volts, and is mounted directly over the spindle, which it drives by means of a Renold silent chain. Beneath the spindle is the regular back-gear, and, when required for large-diameter work, a triple back-gear is placed below the regular one. The gears are thrown into or out of operation by friction clutches so that it is not necessary to stop running while making a change. From the motor to the sprocket on the spindle there is a 3 to 1 speed reduction, the first back-gear reduces again by a ratio of 4 to 1, and the second gives 16 to 1 from sprocket to spindle. The motor is supplied with current on the Crocker-Wheeler 4-wire multiple-voltage system, and is capable of six speeds by the separate voltages and six more by the use of one resistance, or 12 in all in either direction. Its highest speed is 1,100 r.p.m., which transmitted direct to the spindle turns the latter at about 370 r.p.m. The motor's slowest speed—162 r.p.m.—communicated through the triple back-gear makes the slowest speed of the spindle 3⅓ r.p.m. Between these limits there is a total of 36 different speeds in direct, or reverse, rotation.

The Hartness flat turret lathe is made by the Jones & Lamson Machine Company, Springfield, Vt.

The Schwabe Metallic Packing.*

This packing, which is particularly suitable for superheated steam, was designed by Mr. Schwabe, the chief engineer of the engine building department of Breitfeld, Danek & Co., of Prague. This firm and the Erste Bruenner Maschinenbaufabrik of Bruenn have used it with success in Austria, while the Engineering Bureau of Dr. R. Proell, in Dresden, has undertaken its introduction into Germany and other countries.

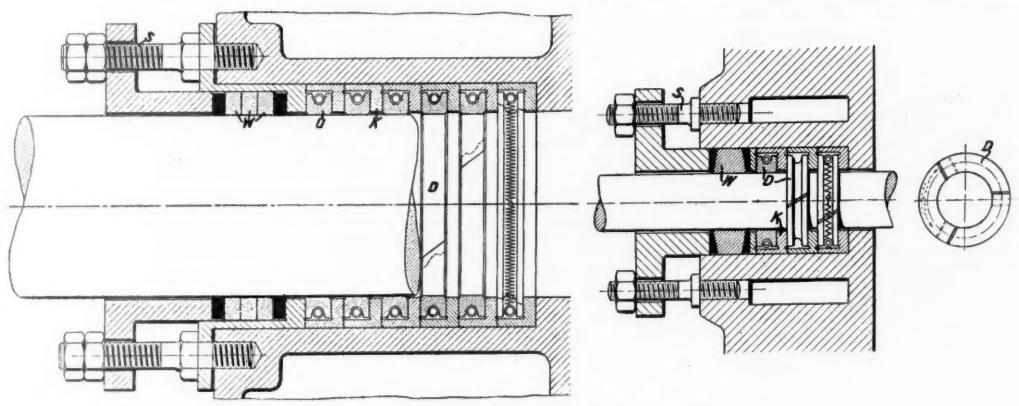
Unlike the usual packings with rings of brass or white metal the packing material in this case is cast iron. This metal was chosen on account of its property of taking a very high polish, an example of which is to be seen in the hard, smooth surface of a steam cylinder. The process is of a molecular nature which is, as yet, not thoroughly understood. The packing consists of separate rings D, Figs. 1 and 2, made of the finest crucible cast iron, each of which is carried by an angle ring K. The packing rings are turned exactly to the diameter of the piston rod, and are divided into three parts by diagonal cuts. Around the outside of each ring is a groove in which is placed a spiral spring pressing the ring against the rod. The play of the packing rings in the angle rings gives the packing enough flexibility to adjust it to any bending of the piston rod. When the engine is put into service the rings rapidly polish themselves to a steam-tight bearing on the rod. The bearing surface becomes glass-hard and with the light pressure of the spiral springs does not wear, so that the trouble and delay caused by the necessity of renewing packing is avoided. In order to give satisfactory service the piston rods must be in good condition, as the rings are turned to size in the factory with great exactitude.

In ordinary service no lubrication is required, the piston rod acquiring, in the cylinder, a light coating of oil which is not removed by the rings owing to the light pressure they exert on the rod. During the time the packing is being broken in a little oil is required, and this is placed between the soft metal packing W and the last cast iron ring. The soft metal packing is put in, as a reserve in case the rod is damaged, and is also useful in holding the small quantity of steam which may blow through while breaking in the cast iron rings. The nuts S, of the outer gland are only drawn up by hand, but even if pulled up tightly the cast iron rings are still free to shift radially so that the packing remains flexible.

Tests have shown that the auxiliary soft metal packing is unnecessary in regular service. Recently on a 1,000 h.p. superheated engine, with a 55 in. stroke, 142 lbs. per sq. in. pressure, and 562 deg. Fahrenheit superheat, the auxiliary packing was removed without any trace of steam leaking through. A further test, of an entirely novel nature, was the indicating of the packing, and this showed by the diagrams obtained that the pressure is reduced gradually until the last ring is free from pressure. The methods of making this test were as follows: A hole was drilled down the stuffing box parallel to the piston rod, and connected to radial holes drilled through the angle rings. A steel tube was ground to fit the longitudinal hole, and being pushed back and forth took the pressure from any desired angle ring to an ordinary indicator. The test was made on the high pressure cylinder of a Schmidt superheated engine having cylinders of 20 in. and 41 in. diameter x 39 in., working with an initial pressure of 128 lbs. per sq. in. The temperature at the various angle rings was measured simultaneously with the indicating. The temperature at the admission valves was 556 deg. Fahr., and the mean cylinder temperature was 373 deg. The fall of temperature in the packing was as follows:

Behind the	1	2	3	4	5 Ring.
Temperature, degrees F	421	399	374	342	300
Drop, degrees F		22	25	32	42

From the foregoing it appears that the Schwabe packing solves a difficult problem, simplicity and reliability being combined with cheapness of construction.



Figs. 1 and 2.—Schwabe Metallic Packing.

*Abstract of an article by J. Finkel, translated from the *Zeitschrift des Vereins deutscher Ingenieure.*

Safety Appliance Law—Extensions of Time.

The Interstate Commerce Commission has acted upon the applications of the several carriers that have applied for extensions of time within which to comply with certain provisions of the amended Safety Appliance Law, which became effective September 1 last.

After hearing testimony, and the reports of its inspectors as to the conditions existing, the Commission has granted the Pennsylvania (east of Pittsburg) an extension of time until July 1, 1904, to comply with the provision of the law which requires every train to be composed of not less than 50 per cent. of air brake cars in working order, with the exception of the following divisions: Maryland & Delaware Division (P. B. & W. R. R.), Western & Middle Division (P. & E.), Elmira & Canandaigua Division (Northern Central), and the West Jersey & Seashore. On these no extension was granted. This extension was granted upon a satisfactory showing that the company's volume of business was so great that it could not handle it successfully with its present comparatively limited yard room, and at the same time do the extra switching necessary to place 50 per cent. of air brake cars in each train in position to be operated by the engineer, as the law requires. To have enforced the law over the exempted portion of the line would have resulted in serious blockades, and serious loss to the public.

On the Pennsylvania Lines West of Pittsburg, the same extension was given to the Conway yard. The remainder of the lines west of Pittsburgh were granted until the first of January, 1904, to enable the Commission to more fully investigate conditions and arrive at a better understanding of the necessity for extending the time. This extension until January 1, 1904, for the purpose of further investigation by the Commission's inspectors was also granted to the following petitioners: Lehigh Valley; Grand Rapids & Indiana; Cincinnati, Hamilton & Dayton; Toledo & Ohio Central; Kanawha & Michigan; Cincinnati, Indianapolis & Western, and Hocking Valley; and to the Erie east of Salamanca, which embraces the New York, Susquehanna & Western, and the New York & New Jersey. The Erie west of Salamanca was granted no relief.

The Zanesville & Western was granted until the first of July, 1904. The Hartwell Railway was granted until the first of September, 1904, as was also the Albany & Northern.

The Boston & Maine was given until January 1, 1904, to equip its passenger cars and passenger locomotives with automatic couplers. The Long Island and the Norfolk & Western withdrew their applications for extension of time within which to comply with the air brake provision of the law.

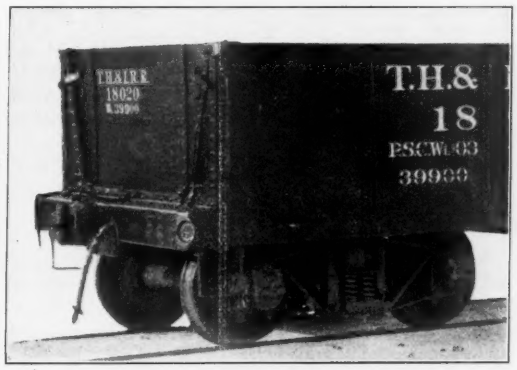
The Baltimore & Ohio was given until March 1, 1904, to equip a number of yard engines with driving wheel brakes, and the Denver & Rio Grande and the Colorado Southern were given until July 1 next in which to apply to Congress for legislation to permit the use of narrow gage locomotives, without driver-brakes, on the understanding that the water brake is to be used.

The Commission's Inspectors have already been ordered to go to those lines that have been granted extensions until January 1, and a thorough examination of those roads will be made.

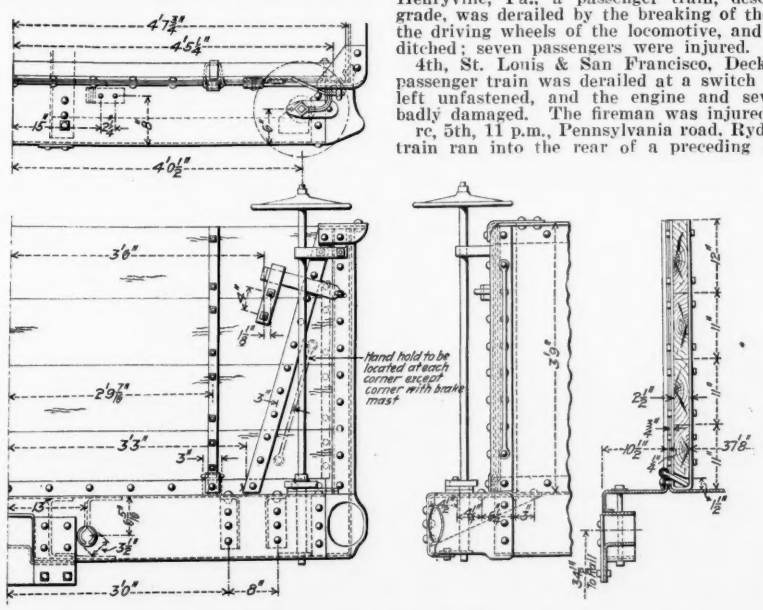
Drop End for Steel Gondola Cars.

The Pennsylvania Railroad 100,000-lbs. capacity all-steel and steel underframe gondolas were illustrated and described in the *Railroad Gazette*, Oct. 10, 1902. These large-capacity cars are now the standard design on that road. They are divided into two general divisions, class Gr and class Gs, the former being steel underframe cars with wooden floor, ends and sides, and the latter, all-steel cars. The Gs cars are further classified into: Class Gs, a plain gondola with fixed ends and flat floor; class Gsa, a drop-bottom gondola with fixed ends; class Gsb, a plain gondola with drop ends; and class Gsc, a drop-bottom gondola with drop ends. In general dimensions the Gr cars and all of the Gs cars are the same.

An interesting detail of the class Gsb and Gsc cars is shown in the accompanying engravings of the end construction of these cars. The drop ends are made of four 2½-in. planks fastened together with ¾-in. x 1¾-in. straps, carried down the outside face, under the bottom plank and up the inside face and bolted to each plank. These ends are 8 ft. 10½ in. long and the inside width of the car is 9 ft. 3½ in., allowing 2½ in. clearance at each side. The corner post of the car is a heavy angle and to this and the top flange of the end sill on each side is riveted a triangular plate 16¾ in. wide at the bottom and reinforced on its diagonal edge with a 3 in. strap. The end is supported against the end thrust of the load by the wide shoulder thus formed. It rests on the floor of the car and also bears outwardly against the vertical flange on the end sill. When raised into position it is locked by dropping a flat bolt secured to the cornerpost, into the keeper bolted on the planks. The hinge is formed



Steel Gondola Car with Drop Ends.



Details of Drop End for Steel Gondola Cars.

by cutting away the bottom plank 1½ in. at the straps and inserting a loose link in the eye thus formed, which link also passes through a bracket riveted to the end sill flange. There are no loose pieces to get lost and every part is strong and substantial enough to stand rough usage. By using the drop end the car is made available for many kinds of service and its earning capacity materially increased.

Train Accidents in the United States in September.[1]

bc, 1st, Chicago, Burlington & Quincy, Hastings, Iowa, butting collision between westbound passenger train No. 3 and an eastbound freight, badly damaging both engines; 12 passengers were injured.

xc, 1st, Pennsylvania Lines, Mingo Junction, Ohio, a passenger train ran over a misplaced switch and collided with some freight cars standing on the side track. The engine was overturned and wrecked; 12 passengers were injured.

xc, 1st, Norfolk & Western, Ridgeway, N. C., the caboose and four cars of a freight train ascending a grade broke away and ran back into the rear of a following passenger train, making a bad wreck. The wreck took fire and was mostly burnt up. The engineman was killed and the fireman fatally scalded.

dn, 1st, Southern Railway, Piedmont, Ala., a freight train drawn by two engines was derailed at a misplaced switch and one of the engines was ditched; a fireman was killed.

dn, 2d, Atchison, Topeka & Santa Fe, Enterprise, Kan., several cars of a freight train were derailed at a misplaced switch and three passengers were injured.

†3d, Southern Railway, Yorkville, S. C., a passenger train broke through the bridge over Fishing Creek and two passengers and three trainmen were killed and 24 persons were injured.

3d, Perth Amboy, N. J., collision between a passenger train of the Central of New Jersey and a train of the Pennsylvania road, consisting of a locomotive and a caboose. There was a dense fog at the time; one trainman was killed and another was injured.

3d, Kansas City Southern, Shreveport, La., a string of 22 freight cars escaped control while being switched and ran about two miles out on the main line and collided with a freight train running at full speed. The engine and eight cars were wrecked. The collision occurred on a high trestle bridge. The engineman and fireman and one brakeman were injured.

eq, 3d, 5 a.m., Delaware, Lackawanna & Western, Henryville, Pa., a passenger train, descending a steep grade, was derailed by the breaking of the tire of one of the driving wheels of the locomotive, and nine cars were ditched; seven passengers were injured.

4th, St. Louis & San Francisco, Deckerville, Ark., a passenger train was derailed at a switch which had been left unfastened, and the engine and several cars were badly damaged. The fireman was injured.

rc, 5th, 11 p.m., Pennsylvania road, Ryde, Pa., a freight train ran into the rear of a preceding freight, and 40 cars were derailed and badly damaged; three trainmen were injured.

bc, 5th, Illinois Central, Dawson, Ky., butting collision of freight trains; two trainmen injured.

unf, 5th, New York, New Haven & Hartford, Collinsville, Conn., a passenger train was derailed at a washout, and the conductor and 12 passengers were injured.

5th, 1 a.m., Chicago, Burlington & Quincy, Chana, Ill., a passenger train was derailed and the engine and first three cars were ditched. The fireman was killed and several passengers were injured.

bc, 6th, Missouri Pacific, Atchison, Kan., butting collision between a passenger train and a light engine; baggageman injured. It is said that the engine was encroaching on the time of the passenger train in consequence of the engineman's watch having stopped.

o, 6th, Chicago & Alton, Greenview, Ill., the locomotive of a freight train was wrecked by the explosion of its boiler; and with several cars, was badly damaged. The engineman was killed and the fireman fatally injured.

10th, Iowa & St. Louis, Novinger, Mo., a train carrying officers of the road was derailed at a point where the roadbed had been weakened by a flood, and one of the occupants of the train was injured.

11th, St. Louis & San Francisco, Beaumont Junction, Kan., a car of powder escaped control while being switched, and ran several miles on the main line, finally colliding with a freight train near Winfield. The powder was exploded by the shock of the collision and two trainmen were killed and two injured.

11th, 1 a.m., St. Louis & San Francisco, Sapulpa, Ind. T., a freight train broke through a bridge and the engine and 15 cars were wrecked. The engineman, fireman and one brakeman were killed.

dn, 11th, Boston & Maine, Boston, Mass., a light engine ran into the open draw over Mystic River and was completely submerged.

unx, 11th, Missouri, Kansas & Texas, Sutherland, Mo., mixed train No. 49 was derailed and two freight cars, the baggage car and one passenger car were overturned; two passengers and two trainmen were injured.

unx, 11th, St. Louis, Iron Mountain & Southern, Van Buren, Ark., a freight train was derailed and the engine and several cars were overturned and ditched; three trainmen were injured.

xc, 12th, Cleveland, Cincinnati, Chicago & St. Louis, Lawrenceburg, Ind., collision between a passenger train and a switching freight, damaging several cars. Two passengers and one employee were injured.

†12th, Chicago, St. Paul, Minneapolis & Omaha, Kempston, Wis., an excursion passenger train was derailed while running at low speed over a piece of track which had been weakened by a flood, and three passengers were killed and four injured.

xc, 13th, Michigan Central, West Bay City, Mich., a collision of freight cars being switched in the yard exploded some dynamite in one of the cars and several cars were wrecked. Two trainmen were killed and three injured and many houses were badly damaged.

unx, 13th, Great Northern, Dassel, Minn., a passenger train was derailed and two passenger cars fell down a bank. A man stealing a ride was killed and several passengers were injured.

rc, 14th, 1 a.m., Houston & Texas Central, Fairbanks, Texas, rear collision of freight trains wrecking one engine and 15 cars; a brakeman was killed.

14th, Chicago & North Western, Desplaines, Ill., a westbound passenger train ran over a misplaced switch and into the rear of a freight train standing on the side track. The baggageman and a number of passengers were injured, the baggageman fatally.

rc, 15th, Southern Railway, Branchville, N. C., a passenger train standing at the station was run into at the rear by a following passenger train and 11 passengers were injured.

unf, 15th, Seaboard Air Line, Madison, Fla., a freight train was derailed at a washout and the engineman and fireman were killed.

15th, 11 p.m., Baltimore & Ohio, Tippecanoe, Ohio, a freight train was derailed at a misplaced switch and the engine and several cars were overturned. The engineman was killed and two other trainmen were injured, one of them fatally. It is said that the switch had been maliciously misplaced.

bc, 16th, Central of New Jersey, Elizabeth, N. J., butting collision between an eastbound passenger train and a westbound freight; a brakeman of the freight train was killed and the engineman of the passenger train was injured.

unf, 16th, New York, New Haven & Hartford, Shelton, Conn., a passenger train was derailed by running over a cow, and the engine and baggage car fell down a bank.

*rc, 19th, Seaboard Air Line, Henderson, N. C., a freight train standing in the yard was run into by a following freight, and two cars of cotton were wrecked. The wreck took fire and was mostly burnt up. One employee was killed.

21st, Baltimore & Ohio, Flushing, Ohio, a freight train was derailed at a derailing switch and the engine fell down a bank and was overturned. The engineman was killed.

*xc, 21st, Boone, Va., collision between freight trains of the Southern Railway and of the Atlantic Coast Line at the crossing of the two roads, wrecking both engines and several cars. The wreck took fire and was mostly burnt up. A brakeman was killed and one other trainman was injured.

unf, 21st, Missouri Pacific, Independence, Kan., a southbound passenger train was derailed at or on the bridge across Elk River and the train ran across the bridge on the sleepers. It is said that the derailment was due to malicious displacement of a rail.

†xc, 22d, Norfolk & Western, Circleville, Ohio, a circus train being switched in the yard was run into by a freight train and several cars were damaged. Two women connected with the circus were injured, one of them fatally.

dn, 22d, Long Island road, Long Island City, N. Y., a train being backed into the station was not properly controlled and it ran off the end of the track, crushing one car against the buffers. Of two men at work near the buffers one was killed and the other fatally injured.

bc, 23d, Seaboard Air Line, Seaboard, N. C., butting collision between a freight train and a train of empty passenger cars. Both engines and several cars of logs were wrecked. One engineman was injured. It is said that the men on the freight train had failed to observe that passenger train No. 83 carried signals indicating that the train of empty cars was to follow.

bc, 24th, Cleveland & Pittsburg, New Philadelphia, Ohio, butting collision between a freight train and a train consisting of an engine and caboose, both trains running at good speed. Two trainmen were killed and three others were injured.

unx, 24th, Missouri Pacific, St. Louis, Mo., an eastbound freight train was derailed and several cars fell over upon the westbound track. A passenger train on this track ran into the wreck and its engine was overturned. The passenger engineman jumped off and fell beneath the engine and was killed, and three other trainmen were injured.

xc, 25th, 1 a.m., Southern Railway, Greensboro, N. C., a freight train backing into a side track collided with some cars of oil standing there, and ruptured one or more of the tanks. The oil was ignited, presumably by lamps in the caboose of the train, and the wreck was mostly burnt up. One or more oil tanks exploded, and burning oil was spread around for a great distance.

xc, 27th, Southern Pacific, Truckee, Cal., collision between a freight train and a yard train, wrecking a caboose and damaging several cars. A brakeman sleeping in the caboose was killed and two others were injured.

unx, 26th, Southern Pacific, Hornbrook, Cal., a freight train was derailed and several cars of oil were wrecked. A brakeman and a boy were injured.

27th, Southern Railway, Danville, Va., southbound fast mail train No. 97 was derailed on or near a trestle bridge and the whole train fell about 75 ft. to the ravine below. The train consisted of two postal cars, one express car, and one baggage car for mails. It is believed that the derailment occurred on a curve approaching the trestle. The engineman, fireman, conductor and six of the messengers on the train were killed, and the other seven of the 16 men who composed the crew were injured. Reports say that this was the first trip of this engineman in charge of the engine of this train. A coroner's jury found that the derailment was due to excessive speed.

unf, 28th, Cincinnati, New Orleans & Texas Pacific, Glen Mary, Tenn., a passenger train was wrecked by running over a cow and the engine and first four cars fell down a bank. The engineman was injured and three mail clerks, one express messenger and two other trainmen were injured. It is said that two of the mail clerks' injuries were fatal.

28th, Chattanooga, Southern, Estelle, Ga., a freight train was derailed on a trestle and 16 cars fell off the bridge to the valley below. A brakeman was injured.

29th, 3 a.m., Lake Erie & Western, Elwood, Ind., a freight train was derailed at the crossing of a street railroad track and the engine and four cars were wrecked. A brakeman riding in the locomotive was killed.

*xc, 30th, Pennsylvania road, Conestoga, Pa., westbound fast mail train No. 11 collided with a freight train which was moving through a crossover track, and the engine, three mail cars, two freight cars and a caboose were wrecked. The wreck took fire and the mail cars were burnt up. The engineman and fireman were injured. There was a dense fog at the time.

bc, 30th, Chicago, Rock Island & Pacific, Centerville, Iowa, butting collision between a freight train and a work train, wrecking both engines and 14 cars. Nine employees were injured, one of them fatally.

[1]Accidents in which injuries are few or slight and the money loss is apparently small, will as a rule be omitted from this list. The official accident record published by the Interstate Commerce Commission quarterly is regularly reprinted in the *Railroad Gazette*. The classification of the accidents in the present list is indicated by the use of the following

ABBREVIATIONS.

rc	Rear collisions.
bc	Butting collisions.
xc	Miscellaneous collisions.
dr	Derailments; defect of roadway.
eq	Derailments; defect of equipment.
dn	Derailments; negligence in operating.
unf	Derailments; unforeseen obstruction.
unx	Derailments; unexplained.
o	Miscellaneous accidents.

An asterisk at the beginning of a paragraph indicates a wreck wholly or partly destroyed by fire; a dagger indicates an accident causing the death of one or more passengers.

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

Just what caused the failure of the traveler used in the erection of the Wabash bridge at Pittsburg is not known, and is difficult to exactly determine, as it is badly wrecked. The traveler was out four panels on the lever arm. It was holding up a bank of eyebars for pin centering when, without any warning, the projecting crane arm broke off, dropping the bars on a barge load of steel, under the bridge, where most of the loss of life occurred. The load under which it gave way was much less than the loads it had been carrying for a month past. The investigation that the American Bridge Company is now making may disclose some hidden defects of material in the traveler or carelessness on the part of the workmen in handling the falls, but until this is done nothing further can be said.

The incomplete typical list of trade-union outrages for September includes an incident of a kind which may possibly have occurred before, but it is unusual. A trade union man tried to lick a non-union worker, without weapons, face to face, and unsupported by a gang. A policeman was so astounded by the novelty of the undertaking that he stopped the fight. This may be regarded, however, as a variant. The list of events shows that the best practice is still considered to be stealing up behind, stoning, and many-to-one and kick-him-when-he-is-down. Some progress appears to be made in the art of clubbing and kicking one man by a mob to the point of insensibility without producing immediate death. This annoying result has now been avoided for a considerable period, although many men who want to work for a living have been disabled, put out of the way of competition, and their families starved. Insanity, suicide and being driven by ostracism and want to drunkenness and stealing are some of the results obtained in increasing quantity; but the by-product, the betterment of the conditions of the union men, seems to be falling off. As to this, accurate information on a sufficiently large scale to establish the general statement is, from the nature of the case, difficult to get; but in the steel building trades it is quite clear that the non-union and the non-striking union men are getting more pay per year than are the turbulent union men. Some of the unions are learning that the profits of anarchy, considered as an industry, are not considerable, and are not permanent. The more intelligent organizations of those employed in railroad work know this, and the September record does not include a single instance of violence by railroad union men. This apparent mental lapse of the International Association of Machinists during this Indian summer season is not quite understandable. They have allowed some days to pass without violence, or new boycotts, or new schemes for restricting production.

Grab-Irons on Locomotive Front Ends.

As noted in another column, the time allowed the railroads in which to comply with the amendment to the Safety Appliance Acts requiring the application of grab-irons to the front ends of road locomotives, originally effective September 1, 1903, has been extended to March 1, 1904. The primary requirement of the amendment is that tender and pilot couplers be made operative without the necessity of trainmen going between the locomotive and car. It is merely extending to locomotives the law for cars, and as this law requires the application of grab-irons to the ends and sides of cars for the safety of trainmen in coupling and uncoupling, the amendment makes necessary grab-irons on the fronts of locomotives. Unquestionably the simple form of reasoning which led up to this enactment was superficial and perhaps silly. With a heart full of pity for the killings and maimings of brakemen, the lawmakers have prescribed in detail precisely the same safety appliance for the front end of a locomotive as for an entirely different structure—a car. It may be right, but if so, it is accidentally right. It has aroused among motive power men an opposition that appears to be general and acute. It is said that the presence of grab-irons on the front ends of locomotives is contrary to the spirit of the Safety Appliance Acts, as they would prove an element of danger rather than a safeguard, by inviting employees to assume unnecessary risks in riding on the pilots. Any arrangement that would increase this hazardous practice is, without question, objectionable; but it is not apparent that a strict compliance with the requirements of the amendment need provide such an arrangement, which, to constitute an inducement to ride must include a foot-hold or step of some kind; and the law does not require steps.

With those locomotives already having steps on the pilots the inducement to employees to ride is already sufficiently strong, since flag-staffs, couplers, coupler braces, etc., furnish all the hand-holds needed to make the act easy of accomplishment. Where there are no steps, it is not easy to believe that the mere presence of a grab-iron on the pilot-beam would be any added inducement to a trainman to attempt to board the locomotive at a point where he could secure a foot-hold only with difficulty, if at all. Therefore it would appear that the question is not one of grab-irons but of steps, with the form of the pilot as a factor. Pilots should be so designed as to make it impossible to obtain a foot-hold on them even where there is no step.

Steps were put on pilots in the old days for trainmen to stand while coupling with pilot bars. When the automatic coupler displaced the pilot bar a great many roads left off the steps, though their presence often saves time when the pilot coupler is used, by enabling it to be got in readiness while the engine is in motion. In way-freight switching the aggregate time saved in this way in a trip is doubtless considerable. Indulgence in this practice hereafter will be a violation of the law, and the inducement to violation—the step—should be abolished on engines now having them.

The real difficulty that will be encountered in complying with the requirements of the amendment will be in formulating a standard practice for operating pilot couplers from the outside. As stated by the committee of the Master Mechanics' Association, reporting in June, the great diversity of arrangement and application of pilot couplers complicates the matter considerably.

Summary of the Case Against the Erie Canal Enlargement.

In a series of recent editorial articles the *Railroad Gazette* has discussed several economic aspects of the proposed 1,000-ton barge canal, and has expressed a belief that it would not be profitable for the State of New York to build such a canal. A summary of the arguments on both sides printed recently in the daily press fails to carry conviction because of the underlying and poorly concealed attitude of mutual hostility. This is unfortunate, because the canal question is one which should be treated in a spirit of absolute fair-mindedness, and the voters should know quite clearly what it is proposed to remedy as well as what the suggested remedy is and its likelihood of effecting a cure. The best and most intelligent agitation in favor of the canal rests on the premise that large amounts of grain are being diverted from New York to other ports for export; but the leading contention of those opposed to the canal is that it would be entirely inadequate to remedy this, and that any increase a canal might effect in the tonnage of grain brought to New York would be slight and would be paid for at a high figure. In brief, it is not to be expected that the grain raised in the southwest can be taken away from Galveston, which is far nearer and more advantageously located for handling the crop than New York is, with or without a barge canal. The grain raised in the northwest is being diverted more and more to the Canadian route, but the portion of this route which is canal only amounts to about 86 miles, as against some three or four times that distance between Buffalo and the Hudson, and the Canadian canal admits boats of 2,200 tons, while the proposed New York canal will admit boats of only 1,000 tons. It seems quite obvious that a long canal, with small boats, is in no shape to compete with a short canal, with large boats, and it would be hard to show why, after the completion of the barge canal, if it ever were completed, there would be reason to suppose that either the Galveston grain or the Montreal grain could be diverted to New York. We quote the canal committee as follows:

"The Dominion of Canada has spent over $60,000,000 during the last fifty years in the construction of canals and the improvement of waterways. These canals are of the most approved and modern type, alongside of which the Erie Canal is but a ditch, and the result of their competition is that they are diverting the western grain traffic from New York to Montreal."

To this it might be added that the proposed barge canal, after the expenditure of 101 millions, plus receipts from the sale of the present property, plus mismanagement, will still be a ditch beside the Canadian canals.

As far as competition with Baltimore and Philadelphia is concerned, a distinction must be drawn sharply between cost of service and rate charged. If the railroads were now carrying grain at cost, and if the canal, by virtue of its State subsidy, could quote a lower figure to the shipper than could be met by the railroads, there would be some assurance that the canal route would secure the grain, as against the competing railroads running to the ports south, and the arguments of those who advocate the canal seem to point directly towards this state of affairs. But it must be remembered that railroads are not carrying grain at cost, and that, rather than lose the traffic, the lines to the ports south could cut far under the present rate, and probably under any rate which could be made to New York. A railroad which has been in operation for years, and has a fixed traffic to meet, is a large and expensive plant to maintain, but if the charges for maintenance and the interest on the bonds are provided for by other kinds of traffic, it is, of course, possible for a special kind of traffic, such as grain, to be hauled without incurring loss, at what might be called the prime cost of moving the train. The Pennsylvania and the Baltimore & Ohio railroads are paying amply for their maintenance without the aid of their grain traffic, and therefore in competing with them the canal is competing against prime cost. President Hadley, of Yale, in reference to the railroad rate war which occurred during the year 1881, pointed out that the Erie canal of that time carried very little grain during the rate war, and showed that when the railroads were carrying grain at a figure approximating operating expenses, or prime cost, as we have designated it above, it became no longer possible for the canal to control the grain traffic. At that time, when railroad rates were maintained, the canal carried a great deal of grain, but the railroads nevertheless had their share, in view, chiefly, of the quicker delivery which they could make. When they carried grain at prime cost, or a rate approximating it, the difference in speed more than balanced any slight economy which still remained in the water haul, and the railroads got the traffic.

Under existing circumstances, owing to the differential in force, the Pennsylvania and the Baltimore & Ohio find it profitable to deliver considerable amounts of grain to New York. But if the barge canal should effect a sweeping reduction in rates, it would no longer be to their advantage to do so. As far back as 1876, when the differential was fully as unpopular as at present, it was pointed out in the *Railroad Gazette* that if equal rates to the seaboard should be established, it would evidently become the interest of the Pennsylvania "to deliver everything in Philadelphia forever thereafter. It certainly would not carry an additional 90 miles for nothing if it could

avoid it." And comment was then made to the effect that it was worthy of consideration whether New York would not suffer more from the diversion of business which this company might effect than it would gain by a rate somewhat lower than the Philadelphia rate, and that this was a matter which deserved the attention of the New York merchants who were anxious for equal rates from the west to Baltimore, Philadelphia and New York. It seems logical to suppose, then, that the effect of the barge canal upon the competition of southern ports with New York would be chiefly to lessen the profits to the railroads concerned on the grain they carried during the open season. It does not appear likely that the amount of grain received at New York would change greatly, one way or the other.

The fundamental basis for this belief is the collateral belief that the railroads will be able, as they were in 1881, to haul grain as cheaply as it is likely to be carried by the canal. It is doubtless true that the economy of working the proposed barge canal will be greater than was the economy of working the Erie canal of 1881. But it must be remembered that very great economies have been made by the railroads during the same period, and that the powerful engines and large cars now in use, in connection with the constant grade and curvature reductions, make it possible to haul grain at a figure much lower than was possible 20 years ago.

The tractive power of the mogul engine of 1881, with cylinders 18 x 24 in., 54 in. drivers and 140 lbs. pressure works out at 17,000 lbs. The tractive power of a simple consolidation of the present time is 40,000 lbs., and the last named will, in ordinary practice, haul a maximum train load of about 2,400 net tons of grain, in a train of 60 cars, 3,420 tons gross load. Working out the equation with the respective ratios of tractive power to net tonnage, it will be seen that 1,020 tons, net, was about the best load of grain that could be hauled 20 years ago, as compared with 2,400 tons to-day, and it is exceedingly doubtful if this load was then ever obtained in actual practice. The economy of the larger train need not be taken up here in detail, since no actual figure of the economy of a larger canal boat can be obtained, for purposes of comparison. It is sufficient to call attention to the fact that a great saving has been effected.

But the preceding arguments have been based on the theory of the canal advocates that the improved waterway will materially reduce rail rates, and it has been shown that if the promised reduction took place its effect would be to lessen certain legitimate railroad profits rather than to bring any more grain to New York. The Canal Committee has recently published a manifesto starting with the following paragraph:

"The Erie Canal is the policeman of transportation. It prevents railroads from unjustly oppressing the people."

The logical inferences to be drawn from this are, first, that the present Erie Canal has a profound influence on the regulation of rates, and second, that the people in localities which are not benefited by the canal must suffer continually from "unjust oppression" by the railroads. It is needless to take up the fallacy of this further than to point out that Baltimore, which has no canal, enjoys a differential against New York which the "policeman" is powerless to arrest. As to the matter of regulation of rates, is it not evident that the railroads can compete for general traffic on water as well as on land? When new rate disturbers compete with the New York, New Haven & Hartford on Long Island Sound, that company does not meet them on land, but on the water. Without doubt the North German Lloyd Steamship Co. could run its own fleet of barges to Buffalo to get such grain as was not previously diverted to Canada or the southern ports, and could carry that grain to its steamships at New York for whatever nominal figure it chose, but a fleet of New York Central barges could destroy the profit of any back haul, and readily take care of any miscellaneous competition that might become formidable, while, in the process, it protected the freight rates of the railroad.

What this all comes to is that New York has a real grievance in the diversion of grain which has been occasioned by the shifting of the centers of the grain producing area and the growth of other seaports, but that the remedy under consideration seems exceedingly unlikely to effect a cure. The subsidy question—for the canal bill is, of course, a subsidy bill—and the economic unfairness touched on in a previous article of taxing the railroads of the State for the support of a competitor need not be dwelt upon here; the question now under consideration is simply whether the canal would perform services in proportion to the outlay—whether it would pay. That the fixed charges and maintenance paid for by the State, plus the charge to the shipper, would make freight carried by the barge canal pay a higher rate for transportation than freight hauled by rail, has been demonstrated again and again. But the canal committee reply to cost arguments that the State is in the position of a man who needs a new pair of shoes. Such a man, they say, does not calculate the cost to himself by estimating the interest on the investment through a period of years; he buys the shoes, and as with the shoes, so with the barge canal. Let it only be pointed out, in closing, that a pair of shoes, whether obtained for cash or credit, are no use to the purchaser, and constitute a distinct extravagance if they are so small that he cannot wear them after he gets them. Neither does it profit any one to buy a $30 sword and go out after a man who has a $20 repeating rifle.

September Accidents.

The condensed record of the principal train accidents which occurred in the United States in September, printed in another column, contains accounts of 24 collisions, 26 derailments, and 1 other accident. Those which were most serious, or which are of special interest by reason of their causes or attending circumstances, occurred as follows:

	Killed.	Injured.
*1st—Ridgeway, N. C.	2	..
†3d—Yorkville, S. C.	5	24
3d—Shreveport, La.	..	3
†12th—Kempston, Wis.	3	4
13th—West Bay City, Mich.	2	3
27th—Danville, Va.	9	7
30th—Conestoga, Pa.	..	2

The number of passengers killed in September was not above the average, though three of the seven bad accidents tabulated above occurred to passenger trains. The worst one, that at Danville, occurred to a fast train carrying no passengers, and the same kind of train suffered at Conestoga. Concerning the cause of the Danville disaster we have no information other than that given in the *Railroad Gazette* of Oct. 2, and in this issue. The reader who recalls the August record (page 691, Sept. 25,) will note that the Danville derailment is the third disaster to a mail train recently reported due to excessive speed—indicating recklessness and disregard of speed limits.

The train derailed at Kempston is said to have been moving at only four miles an hour, indicating that an error of judgment as to the soundness of the roadbed was the immediate cause.

The number of electric car accidents reported in September was 21, in which 17 persons were killed and 145 injured. Eleven of the 17 fatalities are chargeable to two accidents; the butting collision at Pelham, N. H., which was noticed in the *Railroad Gazette* of Sept. 18, page 671, and a case at Chicago on the 30th, where a locomotive struck a street car at a crossing.

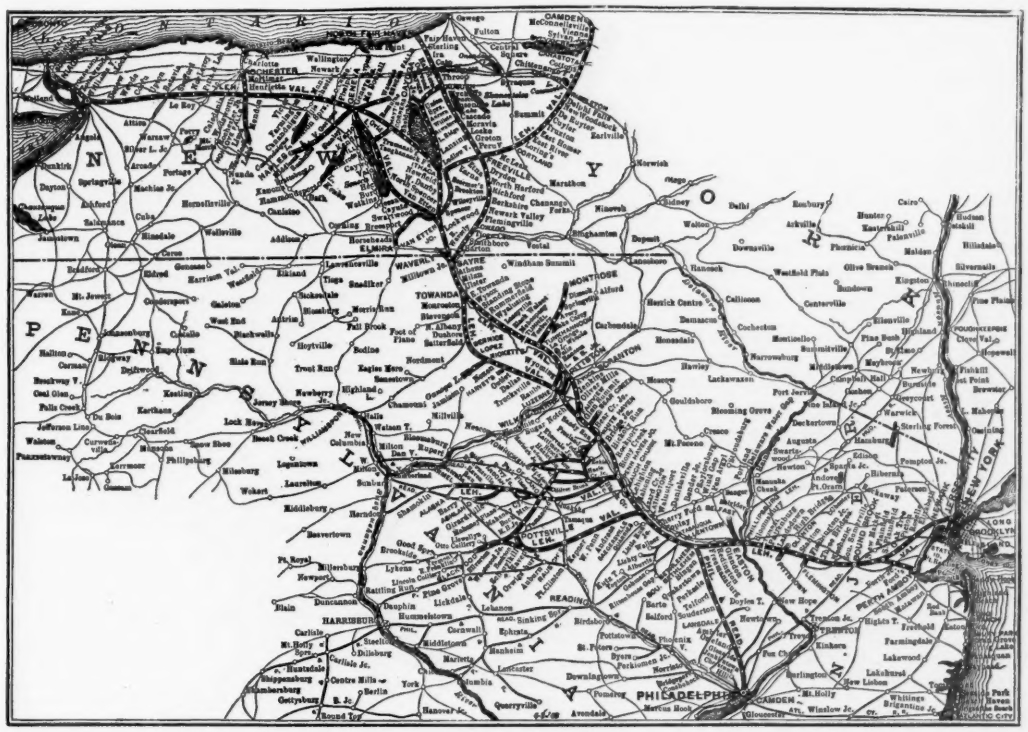
Lehigh Valley.

The current report is the first to be issued under the presidency of Mr. Thomas, and differs quite radically in several respects from its predecessors. A surplus from current operation is shown for the first time since 1899, as the result of a prosperous year. But the profit and loss surplus on the general balance sheet, in place of the increasing deficit which was being carried forward from year to year, was created arbitrarily, by revaluation of the company's plant and equipment. It is well known that Mr. Walter's methods of bookkeeping were very conservative, particularly in regard to charging off assets; whether or not Mr. Thomas is radical in accepting an inventory which adds $3,500,000 to the book value of the railroad equipment and a like amount to the book value of the property of the Lehigh Valley Coal Co. and affiliated companies, is a matter which cannot be determined offhand, but is deserving of careful future consideration. It is sufficient, for the present, to say that the revaluation was part of a plan for readjusting the finances of the company so as to provide for future capital needs. S. D. Warriner, General Manager of the coal properties; Joseph S. Harris, of the Philadelphia & Reading Coal & Iron Co.; W. A. Lathrop, President of the Webster Coal & Coke Co.; Irving A. Stearns, of Coxe Bros., and A. B. Cochran, mining engineer, constituted the committee which inventoried the coal properties, and the inventory of equipment was conducted in accordance with a plan endorsed by the Baldwin Locomotive Works and the American Car & Foundry Co.

The financial reorganization, in brief, provides for the creation of a General Consolidated Mortgage by the Lehigh Valley Railroad Co. of Pennsylvania, which serves as a holding company in that it owns the stocks of the Lehigh Valley *Railway* Co. of New York and the Lehigh Valley *Railroad* Co. of New Jersey. Six corporations of the State of New York and six corporations of the State of New Jersey, constituting substantially the portions of the Lehigh Valley system in those States, have been consolidated into the two companies last named, and the holding company gives unified control of the system from tidewater to the Lakes. The General Consolidated Mortgage provides bonds to the amount of $150,000,000 secured by the railroad property, assets and franchises, of the Lehigh Valley Railroad Company, the stock of the Lehigh Valley Coal Company and the stocks of the consolidated New York and New Jersey railway companies, with other stocks owned by the Lehigh Valley Railroad Company. No prior mortgages are to be hereafter extended at maturity, unless temporarily to escape a time of unusual stringency, but the bonds secured thereby are to be replaced by general consolidated mortgage bonds as opportunity may offer. The mortgage also provides that any amount not exceeding $25,000,000 at any one time may, if the board shall so decide at the time of issue, carry the privilege of conversion into stock, but in no event can the total issue of bonds under the mortgage exceed $150,000,000.

The outstanding fixed obligations which must be provided for, exclusive of car trusts and some minor matters, amount in round numbers to $94,204,000, with annual interest charges of $4,778,445. At the maturity of the present liens the general consolidated mortgage will be a first mortgage on all the property owned and controlled by the Lehigh Valley system, including the stock of the coal property, except as to $12,600,000 of the Lehigh Valley Railroad Company's annuity bonds. As these are a perpetual charge, that lien can only be removed by their purchase or conversion. It is intended that $10,000,000 of these new bonds shall be issued to the railroad company on account of the advances made and to be made by it in payment of car trusts matured, etc., in such amounts as the board may hereafter authorize. As the company is not in immediate need of funds, it is not intended to dispose of any of these bonds at the present time. Provision has been made for the issue after Jan. 1, 1905, of $2,000,000 of these mortgage bonds annually, for expenditures strictly chargeable to capital account and any larger amount annually can only be issued by special authorization of the stockholders.

The current year of operations has been a good one, as is shown by gross earnings of $26,654,503, as against



Lehigh Valley.

$23,919,968 in 1902. This is from the entire system, exclusive of water lines. The total expenses were $18,980,180 as against $17,981,199 last year, leaving net earnings from operation of $7,674,324, with a percentage of operating expenses of 71.21 as against net earnings of $5,938,769 last year, with 75.17 per cent. ratio of operating expenses. The entire freight traffic increased 9.6 per cent., with an increase of 6¼ per cent. in ton miles and the increase in freight revenue was over 2¾ millions, or 14.55 per cent. Average revenue per freight train mile was $2.90 as compared with $2.59 in 1902, and the average train load of revenue freight was 485.5 tons as against 466.8 tons last year. Passenger traffic fell off considerably in the aggregate, as was to have been expected after the Pan-American business last year, but the last seven months of the year, compared with the same period of the year previous and subsequent to the exposition, show an increase of 5.14 per cent.

The maintenance of way charge during the year was $4,099,169, an increase of 11 per cent., and the work done included several new stations, repairs to the ore dock at Tifft Farm, the erection of 17 steel bridges replacing lighter metal structures, and 11 steel bridges replacing wooden structures, the replacement of seven metal bridges with pipe or arch culverts, and other work of this character. A considerable amount of ballasting was also done, 30 miles of sidings were built, three new interlocking plants were put into operation, and others were enlarged, and the additions during the year to automatic signals now give 98 per cent. of main track thus protected. The charge for maintenance of equipment was $4,694,395, which is approximately the same as the charge in 1902, and the work done includes 11 consolidation locomotives and three 10-wheel freight locomotives rebuilt, general repairs to 619 locomotives, which is an increase of 14 per cent. over the year previous, and miscellaneous betterments to motive power and cars. The total number of freight equipment cars in service at the end of the year was 35,057, with 1,028,117 tons capacity, an increase of 481 cars and 28,116 tons capacity. A reserve fund of $665,775, created by credits arising from charging expenses with the value of locomotives and cars scrapped, is available for replacement purposes.

The cost of conducting transportation increased 7½ per cent. during the year, due to increased traffic and increased cost of fuel and wages. The average cost of coal per ton was 13¼ per cent. higher than in 1902. In spite of these adverse features, however, the ratio of conducting transportation to gross earnings decreased from 37.2 per cent. in 1902 to 35.9 per cent. in 1903.

After payment of fixed charges and taxes, and appropriation of $1,266,182 for extraordinary betterments, $2,007,507 was carried forward as net income remaining. The operations of the coal companies materially benefited the result, adding $895,918 to the total net income, in place of the usual deficit. The total production of anthracite amounted to 5,936,016 tons, an increase of 315,144 tons, due chiefly to the depletion of the market following the strike, and to the improved condition of the mines immediately following the disastrous floods of the previous year. The collieries operated by the Lehigh Valley Coal Co. and affiliated companies produced nearly 57 per cent. of the coal transported by the railroad; an increase of more than 10 per cent. over 1902.

During the year, $353,465 was charged to income for improvements and additions to the collieries, and it is proposed to spend a considerably larger amount this year, chiefly in the Wyoming region, with the hope of increasing the tonnage of the district where the largest advance royalties now exist. The coal company found its working capital depleted at the close of the strike, in October, 1902, and issued $2,000,000 bonds, secured by an agreement with the Girard Trust Co., Trustee, under the terms of which the trust company acts as commercial agent of the coal company, and the latter transfers to the trustee its stock of mined and prepared merchantable anthracite coal, now or hereafter on hand, in stock or in transit, and all bills receivable, etc. The bonds may be retired at 102½ and accrued interest, on 30 days notice, at any interest period. With the exception of these bonds, which it is expected will be otherwise provided for, all the outstanding bonds of the coal company will be retired at or before maturity, through the operation of the sinking funds.

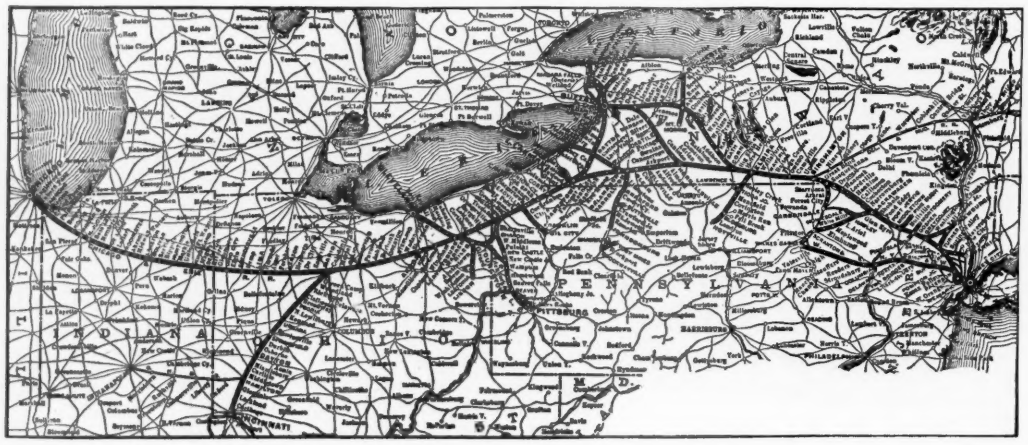
The following is a summary of the most important operating statistics of the railroad:

	1903.	1902.
Coal earnings	$10,104,764	$9,328,959
Other freight	11,609,706	9,627,286
Passenger	3,191,638	3,664,820
Gross earnings	26,654,503	23,919,968
Operating expenses	18,980,180	17,981,199
Net from operation	7,674,324	5,938,769
Net income*	2,007,508	†1,876,708

*After charges for extraordinary betterments.
†Deficit.

Erie.

Since the reorganization of the property in 1895, the Erie has shown, year by year, continuous gains in gross earnings, but in only two years, 1900 and 1903, have the gains been large. In 1900, $38,293,032 was earned; an increase of $4,540,328 over the previous year, while the current earnings of $45,830,413 are $4,935,979 in excess of the earnings for 1902, constituting the largest gross gain which has been made, although the proportionate gain is slightly less than it was in 1900. But the most striking feature of the reports since reorganization has been the persistent reduction of the ratio of operating expenses, which have been kept well in hand, while seriously affecting the otherwise excellent showing of so many leading railroads during the past few years of great prosperity. With a current increase of nearly five millions in gross earnings, operating expenses increased less than two millions, and the ratio of operating expenses was 65.3 per cent., as against 68.29, in 1902. The following table shows gross earnings, net earnings, and the ratio of operating expenses to gross earnings, since 1898.



Erie.

	Gross earnings.	Net earnings.	Operating ratio.
1899	33,740,860	8,302,822	74.57
1900	38,293,032	9,844,427	74.29
1901	39,102,302	10,695,328	72.65
1902	40,894,434	12,967,335	68.29
1903	45,830,413	15,904,655	65.30

Thus it is seen that an increase of 12 millions gross has been accompanied by a gain of 7½ millions net, and that the operating ratio has come down in five years from 74½ to 65⅓.

The Erie is a good road for traffic comparisons, because its mileage has remained practically unchanged since reorganization, although considerable betterment work has at all times been in progress, and economies have thereby been effected. In 1897 the company operated 2,163 miles, of which 645 miles was double-track. At the present time the mileage operated is 2,153 miles, of which 706 miles is double-track and 23 miles has third or fourth track. This is exclusive of 164 miles of road controlled but not operated. Because of the slight change in the territory worked, therefore, increases in earnings can be traced more directly to new traffic secured and to operating efficiency than is often the case in comparing the business done by a railroad through six or seven successive years.

During the strike in the anthracite region, the tonnage of anthracite coal, which in former years has amounted to almost 25 per cent. of the total freight business, fell off considerably, its share in the total traffic being 18.67 in 1903 as against 21.67 per cent. in 1902 and 24 per cent. in 1901, although the decrease in aggregate anthracite tonnage from 6¼ million tons in 1901 to less than 5.9 million tons in 1903 was less than might have been expected; but to utilize the locomotive and car equipment which otherwise would have been idle during the cessation of operation in the anthracite region, new traffic was developed with considerable success, so that the large increase in earnings this year has been made in spite of the falling off in what had previously been the most important kind of traffic carried by the road. Of the new business developed, the largest increase is in bituminous coal, the next largest is in iron and other ores, and next to that come miscellaneous articles, which increased nearly 464,000 tons during the year, the percentage of increase being 34.58. The percentage of increase in iron and other ores was 38, with a total tonnage of 2,706,851. There was a considerable increase in pig and bloom iron, grain, and manufactured articles unclassified. An indication of the higher class freight which was hauled in place of anthracite is shown in the general average ton mile rate, which was .612 cent as compared with .596 cent the previous year, while freight train mile revenue was $2.48 as compared with $2.24. Revenue freight train load, however, shows a large gain and averages 406.2 tons as against 376.5 tons last year. Including company's freight the average train load was 432.7 tons, as against 399.8 tons in 1902, an increase of nearly 33 tons, or 8⅓ per cent. The average car load of revenue freight was slightly under 18 tons, an increase of nearly 5 per cent., and including Company's freight the average car load was over 19 tons, an increase of 5¼ per cent.

The charge against operating expenses for maintenance of way and structures was $3,652,914, which is a smaller amount than has been charged since 1899, but the property is in good condition and the present charge is at the rate of $1,743 per mile of road, which seems a liberal sum in view of the character of the line, particularly after the continuous large maintenance charges during the past few years. The following table shows the charge each year since 1897, both in gross and per mile of road:

	Main. of way.	Per mile.*		Main. of way.	Per mile.*
1898	$3,383,499	$1,609	1901	$4,288,895	$1,995
1899	3,074,317	1,461	1902	3,694,216	1,762
1900	3,974,618	1,889	1903	3,652,914	1,743

*This figure is only approximate, obtained by using as divisor mileage worked, less trackage rights.

Maintenance of equipment amounted to $5,728,760 this year, an increase of $347,480. The cost of repairs and renewals of passenger locomotives increased over $212,000, which was caused in part by the fact that a portion of the cost of 15 new passenger locomotives purchased was charged to renewal. The total number of locomotives at the end of the fiscal year was 1,130, a decrease of 24 from 1903, 33 new locomotives having been received and 57 old ones disposed of and their inventory value charged to expenses. An increase of 131,838 lbs. is shown in total tractive power.

The charge to capital for additions and betterments amounted to $868,949 for improvements consisting chiefly of land, yards, coal storage, signals and interlocking, grade crossing elimination and new sidings. The total charge against capital for improvement work of this character since December, 1895, has been $6,680,828, while charges to capital for new equipment during this same period have amounted to over 15 millions, representing the purchase of 204 locomotives, over 15,000 freight cars, and miscellaneous equipment. No change in outstanding capital stock has been made since 1901, and this stock now stands at $176,271,300, total first and second preferred and common issued. It is interesting to note that net income remaining after payment of operating expenses, taxes, interest and rentals was sufficient to have satisfied both classes of preferred stock (4 per cent. non-cumulative), and paid nearly 3 per cent. on the common, had it been considered expedient to do so. But the first preferred received 3½ per cent.; $808,452 was appropriated for extraordinary betterment, and $5,948,581 was carried as surplus. From this, however, $1,569,404 was transferred to an additional fund for additions and improvements authorized and unexpended at close of year, and $4,379,176 was carried forward to profit and loss balance. The total credit balance, June 30, 1903, was $9,645,143, as compared with $8,449,615, last year.

Boston & Maine.

The report of this company for the fiscal year ending June 30 shows that although gross earnings were $34,266,609, an increase of $1,820,793, operating expenses increased $1,784,999, leaving a small gain of $35,773 in net earnings. The large increase in operating expenses was due to an increase of $2,202,120 in conducting transportation. The report states that this was caused by an increase of $1,162,108 in the cost of locomotive fuel, which, owing to the strikes, the company was forced to purchase in foreign markets at double the prices paid in the home market. During the year $1,835,644 was spent on new equipment, which included 53 locomotives, 1,421 freight cars and 20 miscellaneous cars. Of this amount, $170,370 was charged to operating expenses and the balance of $1,565,274 was charged to capital account. Some of the other larger items of operating expenses were as follows: Repairs of roadbed and track, $1,996,845; renewals, $127,332; maintenance of bridges, $293,636; maintenance of buildings and structures, $463,935. The sum of $700,105 was also spent during the year on the reduction of grade crossings.

The gain in gross earnings was due to an increase of $1,233,369 in freight earnings, $558,531 in passenger earnings, and $28,892 from miscellaneous sources. From a net income of $1,945,194 over fixed charges of $8,088,044, $151,285 was used for sinking fund payments, and $1,771,723 for dividends of 6 per cent. on the preferred, and 7 per cent. on the common stock, leaving a surplus for the year of $22,186. Included in operating expenses is an extra charge of $170,369, which, though applicable to dividends, was used for new equipment. The capitalization was increased during the year by $2,000,000 20-year 3½ per cent. bonds, of which $1,000,000 were sold at par, and by 10,000 shares of common stock, of which 2,000 shares were sold at auction at $190.50 per share. The proceeds from the sale of these securities were used for new equipment, grade crossing reductions, and for rebuilding the line between

Portland, Me., and Rochester, N. H. With regard to the general freight traffic of the company, President Tuttle says that although the export traffic still suffers somewhat from the depression of the previous year, the anthracite traffic has now practically recovered from its unsettled state, while domestic and import freight traffic are in a very satisfactory condition.

New York, Ontario & Western.

In view of the fact that the report of this company includes four months of the coal strike period, the showing made is extremely favorable. Gross earnings were $6,176,518, an increase of $719,822, or 13 per cent. higher than have ever been made before by the company. Operating expenses increased $399,333, leaving an increase in net earnings of $320,489. The large gain in gross receipts was due to an increase of about 10 per cent. in both passenger and freight earnings. Earnings from the immigrant business varied slightly, but the number of excursion trains run during the year was nearly double the number in 1902. Earnings from the transportation of coal were $2,839,245 as compared with $2,517,338 the previous year. Total shipments from Scranton were 2,239,435 gross tons, an increase of 81,833 tons. These shipments were greatly reduced by the strike, which lasted until October, 1902.

The increase in operating expenses was due largely to the increased cost of locomotive fuel. Betterments and improvements during the year aggregating $393,306 were charged to operating expenses, of which amount $183,598 was for equipment, and $209,708 for re-ballasting of roadbed, reduction of grades and rebuilding of bridges. A sum of $423,214 was also appropriated from the surplus of the year of $860,971 for the second-track work from Cadosia to Cornwall. Twenty miles of this work has been completed and grading on 17 more miles is finished. During the year the company purchased new equipment consisting of two locomotives, 200 box cars and eight passenger coaches. The work of building a branch line from Ellenville along part of the abandoned Delaware & Hudson Canal to Kingston, N. Y., 27 miles, was completed in December, 1902. The cost of this improvement was $870,798, of which part was charged to the maintenance of way account, the remainder being paid for the previous year. The Port Jervis, Monticello & Summitville R. R., 41 miles long, was taken over by this company in December, 1902, and it is now operated as a part of the New York, Ontario & Western system.

A table of comparative figures follows:

	1903.	1902.	Inc.
Gross earnings	$6,176,518	$5,456,696	$719,822
Freight earnings	4,964,601	4,358,186	606,435
Passenger earnings	981,288	892,427	88,861
Net earnings	1,619,431	1,298,942	320,489
Operating expenses	4,557,087	4,157,754	399,333
Net income	860,971	658,959	202,012

NEW PUBLICATIONS.

Railroad Curves and Earthwork, by C. Frank Allen, Professor of Railroad Engineering in the Massachusetts Institute of Technology. 198 pp., 7 in. x 4¼ in., flexible leather cover. Published by Messrs. Spon & Chamberlain, New York.

Every general railroad officer who has climbed to his place through the engineering department will sympathize with the expression by one of the greatest among them to this effect: "If I could spare the time for the pleasantest possible vacation, I would spend it in making a reconnaissance and location of a piece of railroad. The charms to the fisherman of knowing a stream and what is happening under the water; to the hunter, of knowing the "kindred of the wild"; to the pastor, of knowing the joys, sorrows and wants of his flock; all these seem to be combined in the work of a locating engineer. He must know the waterways, the lay of the land, its industrial possibilities and the qualities of its people. To these facts he must apply his fund of stored information, but in doing this he cannot get the high degree without imaginative grasp—an ability to create in his own mind a complete picture. It is an artistic quality checked by hard facts.

Mr. Allen's field book teaches the modern methods of reconnaissance, preliminary and final location of a railroad; includes the staking out and measurement of earthwork; and the problems of turn-outs, crossings and haul. The theory and use of spiral easement curves and of vertical curves are shown clearly and concisely. The different kinds of correction in earthwork computation due to prismoidal formula and curvature are demonstrated and explained, and made available both by tables and by diagrams.

Tables for the solution of problems in alinement and for measuring earthwork are published separately. Otherwise the book corresponds in object and form to the field books of Searles or Heuck, but the improvement is great. It was prepared for the use of the students in the author's classes at the Massachusetts Institute of Technology. As it has examples of those problems commonly occurring on construction or location, it will be found useful to the engineer in the field. The arrangement and construction of the book are excellent. Diagrams are within sight of their explanations. The sizes of type used and the arrangement of the demonstrations, make reference to conclusions easy and quick. Conventional symbols are used so that it is not necessary for an engineer to read explanations before availing himself of any part of the book.

TRADE CATALOGUES.

William Wharton, Jr., & Co., Philadelphia, have issued a new catalogue (No. 10). The 179 pages are divided into eight parts, devoted respectively to (1) street railway special track work, (2) layouts of special track work for street railways, (3) special track work for cable railways and electric railways with underground conduit, (4) transfer tables and turn-tables for street railways, (5) industrial and shop railways and trucks and turntables, (6) steam railroad special track work, (7) rails, and (8) engineering data for street railways. The matter is largely made up of illustrations, line drawings and half-tone engravings of the same design being shown on facing pages. The use of manganese steel for parts of greatest wear, for which this firm holds the American rights, is made a prominent feature, the half-tones showing the manganese steel in white to contrast it with the other material. The Wharton switch, which gives an unbroken main line, is shown.

Arthur Koppel, 66 Broad street, New York, issues once a month a useful and instructive publication consisting of a picture of some one of his narrow-gage industrial railroad devices, accompanied by brief printed matter. It is always an interesting issue, although it is in the modest form of a useful blotter.

The H. W. Johns-Manville Co. issues a description of the "Prairie Fire Drag," a device for extinguishing prairie fires. The drag consists of a chain mat covered with an asbestos smothering blanket supplied with chains at two corners, and it may be easily and quickly adjusted to drag by horn of saddle or by singletree.

General Track Work.*

The want of proper drainage of the roadbed is the prime cause of so much general track work. It is not sufficient to have ditches only deep enough to drain the ballast; they should be deep enough to properly drain the sub-grade, and if this is done the ballast will drain itself.

In the construction of new roads, more care should be given to the forming of the sub-grade. It should be finished so that the water will drain from the center to the ditches; to accomplish this a slope of ½ in. to the foot will be ample. This slope should enter the ditches which are not less than 12 in. lower than the outer edge of the slope. All irregularities of sub-grade should be cut down or filled in as the case may be, so that the finished grade will present a uniform appearance. When the sub-grade has been imperfectly finished, during construction, it should be corrected by the maintenance force, by sloping off the sub-grade as far in on the track as can be conveniently reached and forming proper ditches.

One thing in particular attracted my attention to the British railroads, i.e., the perfect surface drainage of cuts. This is done by a system of open stone drains, somewhat resembling the branch of a tree, which empty into ditches at the main stem of the branch. On some roads the surface stone is whitewashed and the banks are sodded. Slides are unknown. No road can afford to use poor and cheap material, and this is particularly true of the non-dividend paying road. The best is none too good, and in the end is much cheaper. The most expensive maintenance is to neglect the track with the idea of rebuilding it when it's too poor to repair.

The heavy and frequent loads passing over the track demand a ballast that will distribute the load over a large area of the sub-grade. This ballast is universally acknowledged to be broken stone. The best stone for ballast is that which will offer the greatest resistance to crushing. The larger sizes of broken stone should be laid next to the sub-grade and stop below the bottom of the ties, from which point a much finer size of stone should be used. This finer size of stone is necessary for several reasons, particularly to facilitate renewal of ties and aid the tamping of the ties so as to secure a uniform and well supported surface. The cost of maintenance is in proportion to the extent of the rail wave movement. An elastic roadbed is a necessity, but it must have uniformity. It should result from the use of materials composing the sub-grade and superstructure of the track and not from imperfect workmanship.

The question of the number of section men per mile of main track is determined largely by the number of trains passing over the road, and the opportunity for men to work. I have seen cases where it took one man to watch another, while he worked, to prevent him from being run down and killed; and have also seen a condition where rails could be changed without the necessity of sending a flag out for protection. Hence, we need not lose time comparing notes as to cost of items of work.

I have little use for the extreme gardening attempts practiced by a few roads to cover a multitude of sins. This time and money had much better be used in tamping low joints, removing decayed ties, spiking track to gage and getting the top dressing of ballast under the ties where it will serve a useful purpose. If the section men have any time beyond that referred to, let them form a neat grass line, but should they have time to form a ballast line by laying the stones by hand, you had better reduce the foreman's force, than permit wasting the company's money in any such frills.

The ideal work train should be equipped to run second section to any passenger train on the road, so that the men can be taken quickly and safely to and from their work. The more rest the men are given at their homes at night, the better condition they are in to work next day. The cars should be made especially for the work for which they are intended. The caboose should be large, well lighted and ventilated, equipped with two flat top stoves for warming the men's coffee. The caboose and supply car should be equipped with air-brakes and whistles. Give your men one day in seven to rest.

*Abstract of a paper by Mr. A. Morrison, Cambria Steel Company, presented to the Roadmasters' and Maintenance of Way Association, October, 1903.

Trade Union Liability For Damages.

A congress of trade unions was held at Leicester, England, in September, and the crisis in trade unionism produced by the judgments of the courts in the Taff Vale railway litigation against the Amalgamated Society of Railway Servants received a great deal of attention. The *Railway News* (London) prints, with comment as below, the following resolution and amendment submitted to the Congress:

That, having regard to the danger to trade union funds involved in any recognition of civil liability, and further, seeing that immunity from claims for damages would carry with it no advantage that is not enjoyed by employers' associations, this Congress is of opinion that the legal decision recently given against trade unions is not in accord with the intention of Parliament when the Trade Union acts of 1871 and 1876 were passed, and hereby instructs the Parliamentary Committee to draft bills to be submitted to Parliament which will definitely secure the immunity of trade union funds against being sued for damages, and thus obtain for trade unions that protection which members of parliament, legal authorities, and trade-unionists believed existed prior to the Taff Vale judgment. Further, the Parliamentary Committee be requested to circularize all parliamentary candidates upon the final policy of this congress relating to this question, and inform trade-unionists which candidates to support in all elections.

To this the following amendment was proposed:

That this congress endorses the principle of the Disputes bill laid before Parliament last session, and, further, that in all future bills presented to Parliament, the constitutional sanction of the rules shall be deemed the only authority for the union funds to be liable under the rules. It also requests the Parliamentary Committee to circularize all parliamentary candidates upon the final policy of this Congress relating to this question, and inform trade-unionists which candidates to support in all elections.

The mover of the amendment expressed the strong, and, as we think, sound opinion that, whatever political party was in power, trade unions would not get back to the position they were in before the Taff Vale decision upset their calculations. If, he urged, they could not get all they wanted, let them get what they could under the circumstances. They wanted the same treatment that the employers had, and the only way of getting something passed through Parliament was to fix responsibility either on the executive, or on the constitutional laws of the association.

This comparatively sane view of the situation was supported by Mr. R. Bell, M. P., on behalf of the railway servants. Mr. Bell pointed out that, if there had been no violation of the rules of the Amalgamated Society, there would have been no Taff Vale judgment. A useful explanation of the present position of the law was then given by Mr. Edmund Browne, standing counsel to the Parliamentary Committee. Mr. Browne stated that it was, for instance, perfectly legal for a body of men to refuse to work with any other body of men, but it was perfectly illegal for the first body of men to leave work without giving their notices in and working out their contracts. A strike was in itself perfectly legal, but the means by which it was brought about might be perfectly illegal. The policy upon which the Congress had to pronounce was a momentous one—whether they would take up an ante-Taff Vale position, or in favor of the terms set out in the amendment.

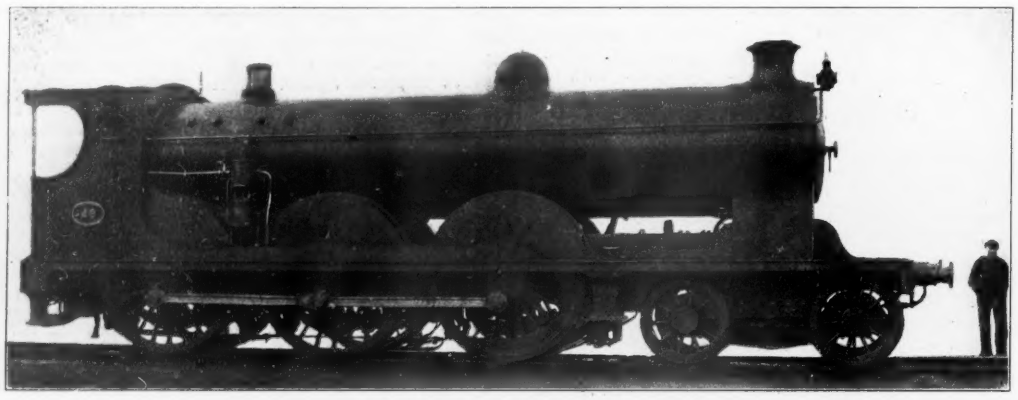
Ultimately, the Congress decided that what they wanted was to get back to "the position they thought they were in before the Taff Vale decision." How this feat of getting back to a place which has never had any real existence is to be achieved remains to be seen. Mr. Bell plainly told the Congress that the policy they have adopted is hopelessly impracticable. But one has ceased to expect common-sense from trade union delegates, and although one society—that of the Railway Servants—has apparently been brought to reason by being mulcted in "thumping" damages, it is probable that the others will have to share the same painful experience before they learn their lesson. Meantime, the position of affairs happily brought about by Mr. Beasley's courage and persistency is not at all unsatisfactory to the industrious and law-abiding sections of the community.

The Russian railroads had 10½ per cent. more passenger traffic and 17 per cent. more freight traffic in 1900 than in 1899. Nearly 9 per cent. of the passenger traffic and 5½ per cent. of the freight traffic was on the railroads in Asia—the trans-Caspian and the Siberian. This was the year of the Chinese rising, when troops were rushed over the Siberian Railroad. But though 9 per cent. of the Russian travel was in Asia, it yielded only 4.7 per cent. of the total passenger earnings—being at the average rate of 0.4 cent per passenger mile and one-third less than in European Russia. The average rate received per ton per mile was 0.801 cent for the whole empire and a trifle more in Asia. It seems astounding that in this vast country, almost all a plain

country, and much of it almost exclusively a grazing country for unknown centuries, only 2,641,523 cattle were shipped by rail in 1900.

Caledonian Six-Coupled Express Locomotive.

The accompanying photograph illustrates the first of a new type of six-coupled express passenger locomotive recently brought out on the Caledonian Railway of Scotland by Mr. J. F. McIntosh, Locomotive Superintendent. It is claimed to be the heaviest engine in the United Kingdom, the total weight of engine and tender in working order being 128 tons. The heating surface is 2,400 sq. ft. The steam pressure is 200 lbs. per sq. in. The



Caledonian Six-Coupled Express Locomotive.

coupled wheels are 78 in. in diameter and the cylinders are 21 in. x 26 in. The fuel capacity of the tender is six tons and the water capacity is 5,000 gallons. The weight of the locomotive is 73 tons and of the tender 55 tons, making the total already stated.

Between Carlisle and Glasgow is encountered the celebrated "Beattock Bank," viz., two miles at 1 in 88, two miles at 1 in 80, and six miles continuously at 1 in 65. The new type of locomotive is designed to haul a 300-ton train over this grade without helper.

The Depression in British Shipping.

According to *The Economist* (London) it is doubtful if the condition of the British shipping industries was ever worse than at present, and, yet, there is some reason to believe that there may shortly be a new demand for cargo steamers. This seeming paradox in a time of very dull business, when there are more bottoms than cargoes, is occasioned by the fact that, although most owners of tramp ships who sold out in the inflated time between 1900 and 1902, when there was a rush in demand for second-hand boats at very high prices, hastened to invest their profits in new vessels at the prevailing high costs, there were some owners too wise to do so, and it is said that some of these astute ones are likely now to replenish their fleets in the belief that, by the time vessels now ordered are put in commission, there will be a revival in the demand for tonnage consequent upon an increase in the world's crops and the natural wearing out of old vessels. Their inducement to take time by the forelock just now must be founded on the belief that the cost of building has now gone as low as it is likely to.

The present conditions in the shipping industries are much worse than is commonly thought, and cause much anxiety. The extent to which steamers are being run at a loss has caused surprise and some adverse comments. Fleets of steamers were bought on credit in the good times and have been heavily mortgaged; perhaps even beyond what they would now fetch in the open market. The charges have to be met by some means, and they can only be met by keeping boats employed somehow. The amount of shipping paper in circulation is enormous, but so long as it is kept afloat all seems to be well. Were the stream to be suddenly stopped, the effect all around would be disastrous. The tramp shareholder knows, or ought to know, that a cargo boat depreciates at the rate of from 8 per cent. to 10 per cent. annually, and he also knows that this depreciation cannot be provided for if she is carrying freight which barely pays voyage expenses. It is said that if a steamer does not pay for herself in five or six years, she is a losing investment. One would like to know how many vessels, apart from the established liners built in and since 1900, are in the position to do this. The decline in freights has been almost universal. Average outward coal freights from Cardiff have been:

	1903.	1902.	1901.	1900.	1898.
To	s. d.	s. d.	s. d.	s. d.	s. d.
Alexandria	4 6	5 4	7 8	12 2	10 0
Barcelona	5 9	6 9	7 11	11 8	10 10½
Genoa	4 0	5 5	6 9	10 4	8 9
Malta	3 6	4 4	5 9	9 4	8 4
Marseilles (fr.)	5.50	6.64	7.97	12.14	11
Port Said	4 6	5 4	7 4	12 1	9 3
Cronstadt	4 6	5 0	5 6½	8 9	7 1
Rio Janeiro	9 10½	11 3	13 9	17 5	16 6
Las Palmas	6 0	6 4	6 7	9 10	....
Bordeaux (fr.)	4¼	5	5.60	7.50	6.45

These few typical instances show declines of from 40 to 70 per cent., or, say, an average of 50 per cent. since 1900. A Cardiff ship owner is quoted as saying that the shipping industry is now passing through the most critical stage that it has seen for the past fifty years; that, while the outward rates have dropped to the lowest figures in the annals of British shipping, the cost of working ships is very high, and bunker coal costs far more than it did in the great depression of eight or nine years ago. Another adverse feature of the present situation is the delay at certain ports. In the Black Sea, for example, 22 to 24 steamers are constantly waiting their turn at Odessa, which means a delay of 14 or 15 days to load.

In connection with this article in *The Economist*, a letter recently published by R. W. Leyland, the Liverpool ship owner, is of interest. Mr. Leyland has written to the Secretary of the Glasgow Ship Owners' Society suggesting that a portion of the sailing ships of the United Kingdom be laid up for three or four months or longer. He says that few, if any, sailing ships are run at a profit to-day. He attributes the present depressed state of the freight market for sailing ships largely to the competition of the subsidized French ships, which are guaranteed against loss by bounty.

TECHNICAL.

Manufacturing and Business.

The Central Car & Foundry Company, of Irvona, Pa., has been incorporated, with a capital of $25,000, by Elmer E. Helman, Frank Gregg, of Irvona, and others.

The Finlay-Ottens Foundry Company, New York, has been incorporated in New York, with a capital of $50,000, by Frederick B. Boyd, Edward M. France and others.

The Stephenson-Adamson Company, Aurora, Ill., is building additions to its machine shop to be used as a storage warehouse. New machinery will also be added.

The Ohio Tube Steel Company was incorporated at Washington, D. C., on Oct. 16, with a capital of $50,000, by James A. Black, Charles W. Embrey and James B. Porter.

The Chicago City Railway after a four months' test on one of its heaviest cars, is supplying its rolling stock with steel wool journal packing, made by The Federal Supply Company.

In the bankruptcy proceedings commenced Oct. 6 against the New York Car Wheel Works of Buffalo, Judge Hazel in the United States District Court on Oct. 20 appointed Tracy C. Becker, receiver.

The George West Steel Bridge Company, of Parkersburg, W. Va., has been incorporated with a capital of $100,000 to build bridges, by J. N. Camden, W. W. Walker, of Parkersburg, and others.

The T. J. Wessner Company, of Jersey City, has been incorporated in New Jersey with a capital of $100,000, to design and build bridges. James W. Leahy, Thomas J. Masser and Theodore Rurode are incorporators.

The Binghamton & Pittsburg Construction Company has been incorporated in New Jersey, with a capital stock of $100,000, to do a general construction business, by K. K. McLaren, A. F. Hansl, of Jersey City, and others.

The American Machinery Company, of Grand Rapids, Mich., reports say, has a contract for woodworking machinery for the shops of the Natal Government railways. The company also has orders from France and Austria.

Richmond P. Scales, who was for some years identified with the Consolidated Car Heating Company of Albany, N. Y., died suddenly in Boston Oct. 17. Mr. Scales resigned as General Manager of the company early last year and retired from business.

The National Valve Company, of Sandusky, Ohio, incorporated with a capital of $100,000, has bought the property and business of the Vincent Valve Company. New machinery will be added. John G. Schurtz, of White Pigeon, Mich., and others are interested.

The Sea Shore Construction Company has been incorporated in New Jersey with a capital stock of $100,000, to do a general construction business and build bridges and railroads; incorporators, Edward S. Lee, Chas. C. Fortner and John C. Slape, all of Atlantic City, N. J.

The office of the Vice-President and General Manager of the Pneumatic Signal Co. is now at Rochester, N. Y., and all correspondence addressed to that officer should hereafter be sent to Rochester. The general offices of the company are still maintained in New York and Chicago.

Kelley, Maus & Co., Chicago, dealers in railroad supplies, announce the removal of the stock and offices of the company to the new building at the Lake street bridge. This will be the headquarters of Mr. O. T. Eads, manager of the railroad supplies department.

The Illinois Car Company is preparing plans to enlarge its shops at Urbana, Ohio, and put in new machinery. Large orders are on hand for the Cleveland, Cincinnati, Chicago & St. Louis, and the company expects to do a large amount of street railroad car repair work.

The Automatic Electric Signal Company of Newark has been incorporated in New Jersey, with a capital of $200,000, by Antonio A. Scaturra, 521 Henry street, Brooklyn; Joseph Gifuni, 106 Lorraine avenue, Montclair, N. J., and Walter C. Law, 346 Broadway, New York.

The American Process Company, New York, has furnished a large sand and cement dryer for Clifford L. Miller & Co., Long Island City. Its capacity is over twenty tons an hour. One of these dryers has been sent to Grimsby, England, for the Grimsby Fish Manure & Oil Company.

The Walter A. Zelnicker Supply Company, of St. Louis, Mo., is now represented in St. Louis and also in Kentucky and West Virginia by Ed. Flowers, formerly with the Miller Supply Company. The same company is represented in Iowa by R. R. Rose, and in Arkansas by R. C. Long, formerly city salesman.

Thomas Anderson, manager of the Youngstown Car Manufacturing Company, died at his home in Youngstown, Ohio, Oct. 18, from heart disease, at the age of 59. Mr. Anderson had been connected with railroads his entire life, entering the car department of the Lafayette & Indianapolis Railroad in 1860. From 1889 to 1902 he was Master Car Builder of the Pittsburg & Western, and later was with the Wheeling & Lake Erie.

The Scherzer rolling lift bridge now building for the South Eastern & Chatham Railway (England), of which Sir Benjamin Baker is consulting engineer, is nearing completion, and rapid progress is also being made upon the Scherzer bridge across the Suir River, in Ireland, for the Fishguard & Rosslare Railway. Mr. Albert H. Scherzer, President of the Scherzer company, brings this information on his return from a visit to Russia, Germany, France, England, and other countries. The company's European agents report favorable business conditions.

The Steam Power Plant of the St. Louis Exposition, now being built by Westinghouse, Church, Kerr & Co., will be fitted with two large central condensing units, each consisting of a 40-inch elevated condenser capable of handling 96,000 lbs. of steam per hour. These condensers are being built by Henry R. Worthington, of New York City, who will supply centrifugal pumps for handling the circulating water. That company will also furnish the rotative dry vacuum pumps, which will remove all air from the condenser system. The boiler feed pumps of this immense power plant are likewise of Worthington make.

Iron and Steel.

The Hattie Ensley furnace of the Sloss-Sheffield Steel & Iron Company at Sheffield, Ala., has resumed work after making extensive repairs.

The Gray's Harbor Iron Works, of Hoquiam, Wash., has enlarged its shops, doubling its floor capacity. New machinery has also been put in.

The John Rice Foundry & Machine Company, of Stevens Point, Wis., will enlarge its shops by building a two-story brick addition 20 ft. x 60 ft., and adding new machinery.

The Lackawanna Steel Company has listed $10,798,000 additional first mortgage 5 per cent. convertible bonds of 1903, on the New York Stock Exchange, making the total $15,000,000 listed to date.

The Ohio Valley Steel Foundry Company has let the contract for the building of its new shops at Paden City near Wheeling, W. Va. The company will make steel castings, sheet bars and merchant bars and sheets.

A committee is now inspecting the various properties of the United States Steel Corporation with the object of economizing in every department. In connection with this plan some of the plants may be closed for a short time.

The Bryant Steel Wheel Company has been incorporated in New Jersey, with a capital of $200,000, to make steel wheels. The incorporators are C. M. Henley, H. H. Zeigler, Joseph Ellis and E. E. Waters, all of Columbus, Ohio.

The Clairton Steel Company will probably continue to be operated independently, negotiations for the sale of the company's property, including three blast furnaces, 12 new open-hearth furnaces at Clairton, and its ore properties, having failed.

The Lackawanna Iron & Steel Company has commenced the shipment of about 125,000 tons of pig iron from its furnaces at Lebanon and at Cornwall, to its plant at Buffalo, N. Y., where the first mill of its new plant commenced work recently.

The Tennessee Coal, Iron & R. R. Company has the following furnaces in blast: Five at Bessemer, five at Ensley, one in Birmingham, one at Oxmoor, all located in Alabama, and one furnace in Tennessee. The rail mill at Ensley is running on full time.

John A. Wright, President of the Lavelle Iron Company, one of the largest independent companies, has resigned because of ill health, and will be succeeded by

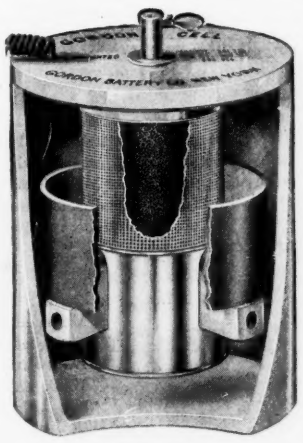
John A. Topping, of New York, formerly First Vice-President of the American Sheet Steel Company.

Interlocking.

The Pneumatic Signal Company reports the following recent contracts for manual interlocking: Harrisburg, Philadelphia & Reading, 78 levers; Shenandoah, do., 29 levers; Bound Brook, Central R. R. of N. J., 33 levers; Stanley, Chicago G. W., 15 levers; Kelley, Chicago & N. W., 21 levers; Omaha Junction, C. G. W., 16 levers; Perry, N. Y. C. & St. L., 5 levers.

The Gordon Battery Cell.

The Gordon Battery Company, 445 East 144th street, New York City, has brought out a new type of its "Gordon cell" in which the perforated cylinder, now made shorter than before, is designed to be removed and thrown away at each renewal of the battery. A new cylinder is supplied with each recharge, thus reducing the labor of the battery-man to the minimum. This cell has been tested in severe service and has given satisfactory results.

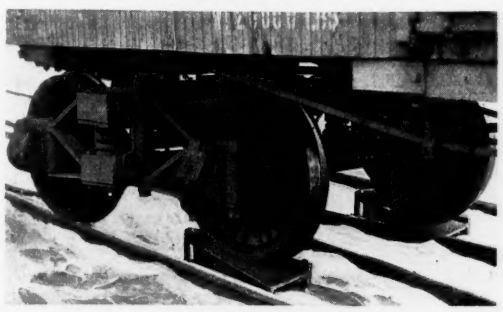


Track Drainage and Tiling.*

The most important factor in track maintenance is perfect drainage. The stability of the track depends on a dry foundation and to have this we must have good side ditches large enough to carry off the water; not only must cuts be ditched, but embankments must be sloped to keep them dry and well drained. Of late years the use of porous tiling has come largely into use for draining cuts and fills. From four to six inches seems to be the size most generally used—four inches on fills and six inches in cuts. In case of wet fills made up of different kinds of material 4 in. tile has been successfully used in Iowa and Missouri on the Santa Fe, placing the tile at right angles to the track from 15 to 30 ft. apart in a V shaped box made of two pieces of 1 in. x 4 in. fence boards placed where the wet material is encountered. In wet and boggy cuts and those of a quicksand nature where all other efforts to drain them and keep good track have failed this porous tiling is doing good work—in fact, far better than anything else that has ever been tried. A common and successful practice is to dig a trench about 3 ft. deep (on a 6 in. grade to the 100 ft.). This puts the tile below the frost line. The tile is then laid on a fence board in the point of the ditch to keep its joints and line even and the trench is filled with cinders which, being porous, carry the water to the tile. This can be done at a cost of about 3 cents per lineal foot for labor and 3 cents per foot for the 6 in. drain tile, and 1 cent per ft. for fence boards, or a total of 7 cents per lineal ft. Some surface ditches have been known to be detrimental and cause bad landslides, etc., but as a rule they do good work when placed the proper distance back from the cut.

The Foster Car Replacer.

On the Chicago & North Western a 90 ton class "M" locomotive was put on the track in less than four minutes by the use of one of the new Foster car and locomotive replacers. The accompanying engraving is from a photograph taken at Kenosha, Wis., and shows the general design and manner of using the replacer. It is a steel casting 30 in. long and 10 in. wide at the lower end, and



the working surface is a triangular flanged incline sloping in two directions so that the wheel gradually slides over towards the rail as it moves up on the incline. Spurs on the bottom of the device hold it in place, hence no spikes are needed. The device works well on the inside or outside of sharp curves or level track and will re-rail all wheels that have a bearing on the ties, however badly the trucks are "skewed" across the track. A set of replacers weighs 200 lbs. The general western sales agent is the Commonwealth Railway Supply Company, Chicago, Ill.

*Abstract of a paper by Mr. J. M. Meade, presented to the Roadmasters' and Maintenance of Way Association, October, 1903.

Camber in Bridges.

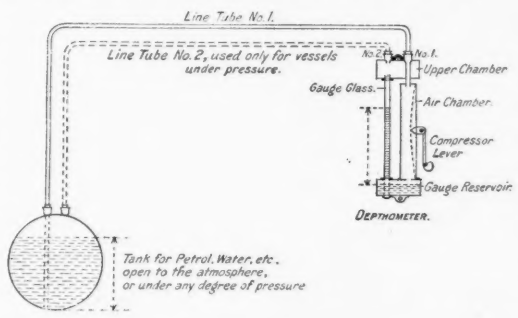
After summing up briefly the practice of such members of the Bridges and Buildings Association as replied to a circular asking for information on the question, "Should ties of bridges be gained so as to leave rail without camber, or should only a portion of camber be taken out?" the committee recommends as follows:

That in all new truss bridges enough camber should be provided to bring all joints to a full bearing when the structure is fully loaded. Take out the excess camber in the framing of the floor system, leaving enough camber in the track so that the bridge will come down level under a full load. Under something less than a full load, the track will still have a slight crown to it, which is less objectionable than a sag would be under a maximum load. Ordinary plate girders under 60 ft. long should be designed without camber. Over 60 ft. long the camber should be equal to the deflection of the girder under a full load. Plate girders of special proportions should be designed for each special case, as no uniform rule would apply to all proportions of girders. Wooden truss bridges require more camber than iron bridges, but the same rule applies to them as to the iron truss bridges.

The report is signed by R. H. Reid, chairman.

A Depthometer.

The following is from a description by United States Consul Waterman, Dublin, Ireland, of a depthometer recently patented by Mr. Leonard Murphy, of Dublin. It is an instrument designed to show the depth of liquids either in open vessels, such as water tanks, vats, ship's holds, wells, etc., or of liquids inclosed in vessels under any degree of pressure, as in the case of petrol tanks in some motor cars and vessels of this kind. It consists of two chambers, fixed one above the other, connected by a gage-glass tube, open at both ends, which reaches almost to the bottom of the lower chamber and only just enters the upper chamber from beneath. The lower chamber, or gage reservoir, has attached to its top a flexible "air chamber" capable of being enlarged or reduced in area by the compressor lever shown in the diagram. To the upper part of the air chamber a short tube and coupling is attached, from which line tube No. 1 is carried to the distant vessel. The line tube may be bent in any way convenient for fixing and should finish at the top of the tank, where it is attached to a dip pipe, the open end of which reaches to the bottom of the tank.


Line Tube No. 1.
Line Tube No. 2, used only for vessels under pressure.
No. 2.
No. 1.
Upper Chamber
Gauge Glass.
Air Chamber.
Compressor Lever
Gauge Reservoir.
DEPTHOMETER.
Tank for Petrol, Water, etc., open to the atmosphere, or under any degree of pressure

If the vessel be under pressure a second line tube (No. 2) is necessary, reaching from the top of the tank to coupling No. 2 of the upper chamber as shown in dotted lines on the diagram. This pipe is not used if the vessel be open to the atmosphere, and in that case coupling No. 2 is left open to the air. The gage reservoir is almost filled with the indicating fluid (petrol, water, etc.), and when at rest the liquid should just appear at the base of the visible portion of the gage glass.

The method of working is as follows: Raise the compressor lever to its highest point, thus causing the air chamber to expand and take in a supply of air which enters at coupling No. 2, passes through the upper chamber, down the gage glass, through the liquid in the gage reservoir, and finally reaches the air chamber. On depressing the lever the air in this chamber becomes compressed and presses on the liquid in the gage reservoir. The air cannot, however, return through the gage glass, as the end of the latter is sealed by the indicating liquid. Some of the air, therefore, passes into the line tube No. 1, and on reaching the tank forces out any liquid which may have risen in the dip pipe, and ultimately the excess of air escapes from the open end of the dip pipe into the liquid in the tank.

During this operation the liquid column in the gage glass will rise gradually to a certain point and then stand. The column ceases to rise the moment the air commences to escape at the open end of the dip pipe in the tank, and the column thus shown will be equal in height to the depth of the liquid in the tank, as the air, having completely filled the line tube, has created an exact balance between the column of liquid in the tank and the indicating column of the instrument.

The depthometer has many advantages in its simplicity, accuracy, ease in fixing, and freedom from any outlay whatever for upkeep. It may be placed at a distance from, and at any level relative to, the tanks—above, below, or on a level with them. Any number of tanks may be connected to one depthometer and the depth of each ascertained by indicating one at a time. The reading can, of course, be reduced proportionately by using mercury or other heavy liquid for the indicating column.

THE SCRAP HEAP.

Notes.

The Belvidere division of the Pennsylvania Railroad north of Trenton was so badly damaged by the flood of October 10 that trains were not run through until the 16th.

According to press reports, the Kansas City Southern has arranged for a service of freight steamships from Port Arthur, Texas, to the principal ocean ports of Great Britain and the continent.

The State of Texas has begun suit in the courts against 21 railroads and the Pullman Company for violating the State anti-trust law. The complaint appears to be based on the fact that the railroads have exclusive contracts with the sleeping car company.

It is announced in San Francisco that the Southern Pacific is doing away with the practice of having train collectors on passenger trains, and conductors are now collecting tickets and fares as formerly. On several divisions in California a number of short trip passenger trains have been taken off. According to the newspapers, this is partly, or wholly, due to the great pressure of freight traffic.

The number of men dismissed or suspended from the shops of the Pennsylvania, at Altoona, in accordance with the order for the reduction of expenses noticed last week, was 10 per cent. of the total force, or about 820. At Bloomington, Ill., it is said that the Chicago & Alton has just made an increase of 8 to 12 per cent. in the wages of machinists and boiler makers. The Chicago, Rock Island & Pacific has made an important increase in the wages of its telegraph operators.

According to the New York City papers, four of the railroads terminating in Jersey City will, in the near future, have "up-town" ferries. The Erie has long had a ferry from its Jersey City station to 23d street, New York, and the Pennsylvania has been running one to that street for several years. Now, it is announced that the officers of New York City have made agreements granting dock privileges which will lead to the establishment of ferries terminating between 22d street and 24th street, by the Central of New Jersey, and the Delaware, Lackawanna & Western.

On the Philadelphia & Reading Railroad one night last week near Sheridan, Pa., a party of freight car robbers adopted the business-like expedient of tampering with a Hall disk signal to stop a train at the precise point where they wished to unload their booty. Two or three of the men boarded a freight train, and after it was well in motion climbed down from the roof to the inside of a car and threw out such goods as they found worth stealing; and their accomplices, posted at the appointed place along the line, opened the iron box at the foot of a signal post and succeeded in turning the signal to the stop position for the train which had been agreed upon. Seven battery jars were smashed and the signal mechanism was damaged.

The Railroad Commission of Arkansas on Oct. 14 made an order fixing through joint passenger rates on all railroads in the State in accordance with a recent act of the Legislature. The order requires that through tickets shall be sold when requested at any station on any road where a ticket agent is stationed, to another station on any other road in the State, and that the rate shall not exceed the sum of the locals. The commission does not reduce any rates, as had been expected, and does not require the short lines to establish additional stations or agents. The short lines may continue to charge the present rates—5 cents for roads under 75 miles in length and 8 cents for roads under 15 miles, as proved specifically by statute; but in selling through tickets the joint rate shall in no case exceed the sum of the locals.

Seventeen Workmen Killed in a Collision.

On the morning of October 17, about 4 o'clock, a rear collision of work trains at Washington's Crossing, N. J., on the Belvidere division of the Pennsylvania Railroad, crushed two cars loaded with Italian and negro laborers. Seventeen of the men were killed and 34 injured.

Bridge Disaster at Pittsburg.

On Monday morning, October 19, a traveler used in the construction of the new Wabash railroad bridge across the Monongahela River at Pittsburg, broke and fell suddenly to a barge loaded with steel lying in the river below: and eight or more workmen were killed. Six others were injured.

The Block System on the Illinois Central.

It is announced from Chicago that the Illinois Central has decided to adopt the telegraph block system throughout its lines, except, of course, on those portions where automatic block signals are already in use. It is the intention of the officers of the company to carry out this improvement on 3,000 miles of line within the next three years. This is a somewhat radical move as, although the Illinois Central has used automatic block signals for more than 10 years, it has made no use whatever of the block system except on those lines which are equipped with automatic signals.

East Chicago Ship Canal.

Governor Durbin, of Indiana, and party of State officials will visit East Chicago, Ind., on the 24th for the

purpose of starting work upon the East Chicago Ship Canal, which will connect Indiana Harbor, on Lake Michigan, with the Grand Calumet River. The Great Lakes Dredging Company, of Chicago, has the contract for making the canal; the specifications calling for a canal three and one-half miles long, 20 ft. deep and 100 ft. wide, to be completed in two years. The harbor at Indiana Harbor is deep enough to accommodate the largest vessels. (See R. R. Construction.)

Dates For Getting Space at St. Louis.

Notice has been sent by the division of exhibits, department of liberal arts, of the St. Louis Exposition, that applications for space for exhibits in the exposition buildings must be filed on or before the following dates: Machinery and mechanical appliances not intended for exhibition in operation, November 1, 1903; works of art, natural and manufactured products not herein expressly classified, December 1, 1903; special concessions to individuals, associations and corporations, December 1, 1903. The time for filing applications to exhibit machinery and mechanical appliances in operation expired October 1st.

The Training of Naval Engineers.

A board of naval officers consisting of Capt. G. A. Converse, Commander J. A. Perry and Lieut. Cleland Davis has been appointed by the Navy Department to report on the training of line officers of the Navy in engineering, which has been made necessary by the consolidation of the line and Engineer Corps by the Naval Personnel Act of 1899. The Board is to submit a plan for the establishment of an engineering school; and is to recommend at what period in their professional career officers should receive instruction. The Board must consider the further instruction of officers showing a special aptitude for engineering, and what measures should be adopted to insure a sufficient number of officers giving their attention to engineering and whether their status should differ in any way from that of line officers in corresponding grades.

A Mile-a-Minute Regular Schedule.

It appears from an article in *Herapath's Journal* that the Great Western Railway of England now runs a train regularly from London to Bristol, 113 miles, in two hours. It is called the "60-mile-an-hour" train, a title which apparently involves a bit of poetic (or some other) license. It is the 10.50 a.m. Cornish express from Paddington. On the first day, Oct. 1, it was a train of more than average weight, having nine eight-wheeled vehicles, including a dining-car, or nearly 230 tons coach load. The engine was the "City of Hereford." The first 52 miles were covered just within the 52 minutes, Didcot being passed 2½ minutes ahead of schedule, in spite of a long repairing slack at Maidenhead. Thence to Swindon there were unluckily three signal checks, but Swindon was passed nearly 1½ minutes early. The 107th mile post (Bath) was passed in exactly 105¾ minutes. The slip carriages ran to rest at Bath platform in just 106 minutes from the start.

Rebuilding Bridges at Kansas City.

The work of repairing or rebuilding the bridges destroyed by the flood of last summer at Kansas City is progressing rapidly. The Chicago Great Western is building a new bridge at the mouth of the Kaw and contracts have been let for a new bridge for the Metropolitan Street Railway Company at James street. The Kansas City Southern is picking up the 197 ft. span which fell in 8 ft. of mud. This span was loaded with cars and weighed 250 tons. The work of recovery was begun by tipping the bridge right side up by means of sledges and heavy blocks and tackles. After being righted the span will be turned around parallel to its original position on the piers and slid in position by means of inclined planes extending from each pier to the river bottom. The destroyed span of the Flow Line bridge has been temporarily replaced by a suspension span made of street railroad cables, etc. A photograph of this bridge was shown in the *Railroad Gazette* of Sept. 18. Messrs. Waddell and Hedrick have recommended that a tunnel be built beneath the river for the flow lines or else place the new flow line bridge alongside an existing bridge and connect the spans of both bridges so as to give greater lateral strength. The Rock Island and the Union Pacific will also pick up fallen spans.

The New Port of Vera Cruz.

The last bulletin of the American Geographical Society contains an article on the improvements which have converted Vera Cruz into a safe harbor. Vera Cruz has always been the chief port of Mexico, and in the fiscal year 1901, 338 vessels from foreign ports with a tonnage of 913,698 entered the harbor. The value of the imports in that year expressed in Mexican dollars, which are worth something under 50 cents, was $22,349,788, and the exports, $21,954,876. Yet, while doing this large business, Vera Cruz was one of the poorest ports in America in its shipping facilities. Large vessels were not able to reach the small stone pier projecting into the roadstead and were forced to lighter their cargoes. There was no protection against the storms of the Gulf, and during the hurricane season every sailing vessel which cast anchor in front of the town did so at the peril of life and cargo, and every steamer kept up steam ready to put to sea. In a single year 13 vessels dragged their anchors, and were dashed to pieces on the rocks.

A new port, said to be the equal of any artificial port in the world, and costing about $30,000,000, Mexican money, was opened by President Diaz on March 6, 1902. The problem was to convert the open roadstead into a protected harbor by means of artificial defences combined with natural features. The natural features were the coral reefs partly encircling the bay, which previously had been chiefly a danger, but were now made to subserve the plan for harbor protection.

This much has been gained, therefore, but it still remains imperatively necessary to improve the health of the city. In previous years the city had no good sewers, and its water was not fit to drink, occasioning yellow fever, which gave the city such an evil reputation. During the past year new sewerage and water supply works have been rapidly advanced, and the near future ought to see Vera Cruz transformed into a safe, commodious and healthful port.

Sanitary Arrangements for Small Stations Without Water or Sewer Systems.

Some extracts from the committee report on the above subject, made to the Association of Railway Superintendents of Bridges and Buildings, are given below:

On the Toledo, Peoria & Western, at places of from 300 to 2,000 inhabitants, are some closets, the only connection to which is through the waiting room. They stand from 10 to 40 ft. away, and are connected by two neatly built wings about 7 ft. high, and about 4 ft. apart. No trouble whatever is had in keeping them clean, as they are not accessible by the general public. Air-slaked lime is provided so that if there is any offensive odor, it is the fault of the station men.

One member on the Southern writes: Where a vault cannot be dug, I set the closet up high enough to admit of drawers being inserted under the floor from the rear side, that can be removed, carted away, emptied and returned by scavengers at small cost, or a new set of drawers put in. In either case I find that a little lime or other disinfectant is very good. We keep one or two neatly painted water barrels and at least two pails at every station. The water barrels are kept filled with water, and from these the agent or other station employees can always get water for scrubbing purposes.

The President of the Board of Health of Memphis, Tenn., wrote, in response to a letter from the committee: The best disinfectants you can use are chloride of lime or sulphate of iron (copperas). More powerful disinfectants are costly.

I am utterly opposed to vaults. Where cremation is impracticable, I would suggest the use of the so-called "dry earth" system. This means the use of tubs, or boxes, which are removed at stated intervals. While in use, the deposits should be covered once daily with lime or dry earth.

The report is signed by J. H. Markley, chairman; F. J. Leavitt, G. J. Patterson, E. B. Ashby, T. J. Darracott, A. W. Merrick.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

International Association of Car Workers.

This organization held a convention at Hartford, Conn., last week. It was voted to move the headquarters from Buffalo to Chicago. A. T. Fish, of Buffalo, was re-elected President, and C. C. Gaskins, of Chicago, is Secretary.

Railway Signaling Club.

The annual meeting of the Railway Signaling Club will be held at The Wayne Hotel, Detroit, Mich., beginning Tuesday, Nov. 10, at 2 p.m. There will probably be afternoon and evening sessions on Tuesday and one or two sessions on the following day. The rates at The Wayne are, on the American plan, $2.50 per day, or $3 for a room with bath; on the European plan $1 a day, or $1.50 including bath. Reports are expected from the committees on signal and track circuits; on organization; on cost of installing iron and copper wire line circuits; on distant signals, on three-position signals as compared with separate home and distant, and on automatic signaling for single track.

The Secretary advises that further announcements will be made before the meeting.

PERSONAL.

—Colonel R. E. Goodell, who was Treasurer of the Chicago & Alton in the sixties, died at his home in Denver, Colo., on Oct. 19.

—Mr. Bayard Butler, who was Treasurer of the Pennsylvania Railroad from 1874 to 1877, died at his home in Philadelphia on Oct. 12, aged 60 years.

—Mr. Spencer R. Atkinson has resigned as Chairman of the Georgia State Railroad Commission, and will be succeeded as Commissioner by H. Warner Hill.

—Mr. C. L. Hilleary, Assistant General Passenger Agent of the Cleveland, Cincinnati, Chicago & St. Louis at St. Louis, Mo., has been appointed Traffic Manager for the St. Louis World's Fair.

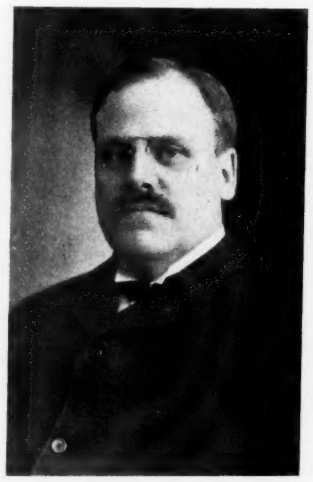
—General Isaac J. Wistar, for a number of years President of the Pennsylvania Railroad Coal Companies, has resigned, and Mr. Morris Williams has been chosen to succeed him.

—Mr. R. J. Sullivan, Superintendent of the Missouri, Kansas & Texas at Denison, Texas, has been in railroad service since 1880, when he began as a telegraph operator on the Missouri Pacific. In 1885 he went to the Missouri, Kansas & Texas, and was with this latter company for about 14 years. From there he went to the Fort Worth & Denver City as chief despatcher, but soon returned to the Missouri, Kansas & Texas. He was appointed Trainmaster, and remained as such until his recent promotion to the Superintendency at Denison.

—Mr. Francis Homer Kingsbury, for many years Eastern Superintendent of the Star Union Line (Pennsylvania Railroad), died at his home in East Orange, N. J., on Oct. 14. Mr. Kingsbury was born at Newton, Mass., in 1837. He entered railroad service in 1863 as a clerk for the Star Union Fast Freight Line, later becoming Superintendent. From 1874 to 1886 he was Assistant General Freight Agent of the Pittsburg, Cincinnati & St. Louis, and in the latter year (1886) he was made Through Freight Agent of the Pennsylvania. In 1888 he was promoted to be Eastern Superintendent of the Star Union Line.

—Mr. F. T. Bowles, the new Superintendent of the Peoria Division of the Lake Erie & Western, at LaFayette, Ind., is about 40 years old. He was for a number of years on the Pittsburg, Cincinnati, Chicago & St. Louis. He served on the Chesapeake & Ohio as a fireman, Engineer and Conductor, and from 1895 to 1900 was Engineer on the Illinois Central. In July, 1900, he went to the Lake Erie & Western as Road Foreman of Engines. During the past year Mr. Bowles has been Superintendent of the Fort Wayne, Cincinnati & Louisville Division, from which position he is now transferred to the Superintendency at LaFayette.

—Mr. Charles A. Goodnow, the retiring General Manager of the Chicago, Rock Island & Pacific, is a native of Massachusetts, having been born in Baldwinsville in 1853. Mr. Goodnow has been in railroad service since 1868, beginning as a telegraph operator on the Vermont & Massachusetts. When the Troy & Greenfield was operated by the State of Massachusetts, he was chief train despatcher, but resigned in 1881, to go to the New Haven & Northampton as Superintendent. In 1886, Mr. Goodnow went west and for a time was Superintendent of Construction on the Chicago, Milwaukee & St. Paul, but soon was appointed Superintendent at Marion, Iowa. In 1895 he was promoted to be Assistant General Superintendent at Chicago, and later (1900) to the General Superintendency. He held this position in April, 1902, when he was chosen General Manager of the Rock Island to succeed Mr. Hitt. Mr. Goodnow has earned reputation as an accomplished operating officer. His work in railroad associations and in print show him to be a student, and his executive ability has been demonstrated.



ELECTIONS AND APPOINTMENTS.

Boston & Albany.—A. J. Fries has been appointed Master Mechanic, with headquarters at Allston, Mass., succeeding W. H. Taft, resigned.

Brooklyn Rapid Transit Company.—W. O. Wood, hitherto General Superintendent of the Detroit & River St. Clair, has been appointed Superintendent of the Elevated lines of the B. R. T., succeeding G. W. Edwards, resigned.

Canadian Pacific.—E. V. Skinner, hitherto General Eastern Agent, has been appointed Assistant Traffic Manager, with jurisdiction over the territory included in the General Eastern Agency, with office at New York.

Chicago & North Western.—George W. Dailey, hitherto Assistant Superintendent of the Iowa Division, has been appointed Acting Superintendent of Telegraph, with headquarters at Chicago, succeeding G. H. Thayer, Superintendent of Telegraph.

Chicago, Rock Island & Pacific.—The headquarters of A. T. Abbott, Superintendent, have been removed from Colorado Springs, Colo., to Goodland, Kan.

Delaware & Hudson.—A. T. Benjamin has been appointed Assistant Superintendent, with headquarters at Albany, N. Y., succeeding H. C. North, promoted to be Terminal Agent at Albany.

Evansville & Terre Haute.—W. H. Moore, J. H. Moore, W. B. Leeds and B. F. Yoakum have been elected Directors.

Great Northern of Canada.—J. B. Musgrave, Master Car Builder, with headquarters at Quebec, Que., has resigned and that position has been abolished.

Hearne & Brazos Valley.—E. M. Moursund has been appointed Vice-President and General Manager, succeeding P. A. Gorman, who has resigned to go to the Trinity Brazos Railway, with office at Hillsborough.

Illinois Central.—F. B. Harriman, Superintendent of the Dubuque Division, has been transferred to Chicago, where he will be Superintendent of the Chicago Division, succeeding A. H. Egan, who has been transferred to the Omaha Division, with headquarters at Fort Dodge, Iowa, succeeding B. Gilleas, who in turn will succeed Mr. Harriman at Dubuque, Iowa.

Montana.—E. H. Hoar, hitherto Superintendent of the Tacoma & Eastern, has been appointed Superintendent of the Montana, with headquarters at Lombard, Mont.

Norfolk & Western.—D. E. Spangler, hitherto Car Service Agent, has been appointed Superintendent of Transportation, with headquarters at Roanoke, Va.

Northern Pacific.—Howard Elliott, hitherto Second Vice-President of the Chicago, Burlington & Quincy, has been elected President of the N. P., succeeding C. S. Mellen, resigned, to become President of the New Haven road.

Oregon Short Line.—At the annual meeting held recently, W. V. S. Thorne, J. H. Hyde and P. M. Warburg were elected Directors, succeeding T. J. Coolidge, Jr., F. S. Bangs and W. E. Glyn, resigned.

Peoria & Pekin Union.—P. H. Niederlander has been appointed Superintendent.

Pere Marquette.—P. N. Place has been appointed Superintendent of the Grand Rapids District, with headquarters at Grand Rapids, Mich., succeeding C. M. Hunt, resigned. W. H. Stillwell has been appointed Superintendent of the Saginaw District, with office at Saginaw, succeeding Mr. Place.

Pullman Company.—W. Lucas has been appointed District Superintendent, with headquarters at Omaha, Neb., succeeding the late J. F. Richardson.

St. Louis & San Francisco.—J. C. Lovrien has been appointed Assistant General Passenger Agent with headquarters at Kansas City, Mo., succeeding James Donahue, resigned.

St. Louis, Troy & Eastern.—J. J. O'Brien has been appointed Superintendent.

Tacoma & Eastern.—See Montana above.

Texas & New Orleans.—L. Beauman, Resident Engineer, with headquarters at Houston, Texas, has resigned.

Texas Southern.—E. C. Farrell has been appointed Auditor, with headquarters at Marshall, Texas, succeeding E. B. Couch, resigned.

Union Pacific.—W. A. Deuel has been appointed Superintendent of the Nebraska Division, with headquarters at Omaha, Neb. H. C. Ferris, hitherto Assistant Superintendent, has been appointed Superintendent of the Colorado Division, with headquarters at Denver, Colo., succeeding Mr. Deuel.

Wabash.—G. J. Gould has been elected Chairman of the Board. O. D. Ashley, hitherto Chairman of the Board, has been elected Vice-President in charge of the New York office.

LOCOMOTIVE BUILDING.

The American R. R. of Porto Rico is having three locomotives built at the Baldwin Works.

The Baldwin Works are building one locomotive for the Alabama & Vicksburg, and one locomotive for the Illinois Terminal.

The Michigan Central has ordered four simple Pacific (4-6-2) locomotives from the Schenectady Works of the American Locomotive Co., for April, 1904, delivery. The locomotives will weigh 213,000 lbs., with 138,200 lbs. on the drivers; cylinders, 22 in. x 26 in.; diameter of drivers, 75 in.; straight top radial stay boilers, with a working steam pressure of 200 lbs.; heating surface, 2,850 sq. ft.; 314 charcoal iron tubes, 2¼ in. in diameter and 20 ft. long; carbon steel fire-box, 96⅛ in. long and 75¼ in. wide; grate area, 50.3 sq. ft.; tank capacity, 6,000 gal. of water and 10 tons of coal. The special equipment includes: Westinghouse air-brakes, hammered open hearth steel axles, Michigan Central bell ringers, magnesia sectional boiler lagging, "Diamond" special brake-beams, Gould couplers, Kelly headlights, Hancock composite injectors, Monarch bronze National-Fulton journal bearings, U. S. metallic piston and valve rod packings, Consolidated safety valves, Leach sanding devices, Detroit sight-feed lubricators, Ashcroft steam gages, Consolidated steam heat equipment and Midvale driving wheel tires.

The Missouri Pacific, as reported in our issue of October 16, has ordered 35 locomotives: 15 simple Atlantic (4-4-2) and 20 simple six-wheel switching (0-6-0) locomotives from the American Locomotive Co. The Atlantic type locomotives will weigh 184,000 lbs., with 100,000 lbs. on the drivers; cylinders, 21 in. x 26 in.; diameter of drivers, 79 in.; radial stayed extended wagon top boilers, with a working steam pressure of 200 lbs.; 362 tubes, 2 in. in diameter and 16 ft. long; carbon acid steel fire-box, 97 in. long and 68 in. wide; tank capacity, 6,000 gal. of water and 12 tons of coal. The switching locomotives will weigh 132,000 lbs.; cylinders, 19 in. x 26 in.; diameter of drivers, 51 in.; radial stayed straight top boilers, with a working steam pressure of 180 lbs.; heating surface, 1,756 sq. ft.; 280 iron tubes, 2 in. in diameter and 11 ft. long; fire-box, 9 ft. long and 3 ft. 5⅝ in. wide; grate area, 31.4 sq. ft.; tank capacity, 4,000 gal. of water and six tons of coal. The special equipment for both classes includes: Westinghouse air-brakes; open hearth steel axles for the Atlantic type locomotives; magnesia boiler lagging; National-Hollow brake-beams for the Atlantic type locomotives, Sterlingworth brake-beams for the switching locomotives; Tower couplers and Pyle-National headlights for the Atlantic type locomotives; Monitor injectors; Jerome piston and valve rod packings and Consolidated safety valves for the Atlantic type locomotives; Leach sanding devices; Nathan sight-feed lubricators; Railway Steel-Spring Co.'s springs; Gold steam heat equipment for the Atlantic type locomotives and Midvale driving wheel tires.

CAR BUILDING.

The Union Tank Line is in the market for 100 cars.

The Chicago, Cincinnati & Louisville denies that it is in the market for new equipment.

The Zanesville & Western has ordered 250 coal cars of 80,000 lbs. capacity from the Pullman Company.

The Paragon Refining Company, Toledo, Ohio, are having 20 tank cars built by the Pressed Steel Car Company.

The Jonesboro, Lake City & Eastern is having 10 flat cars of 50,000 lbs. capacity built by the Georgia Car & Mfg. Co.

The Atlantic Coast Line has ordered 50 flat cars to be built at its shops at Wilmington, N. C. This is in addition to the order of 500 cars reported in our issue of Oct. 16.

The White Pass & Yukon, as reported in our issue of September 25, will build this winter two day coaches at its own shops. The coaches will weigh 38,000 lbs., and measure 40 ft. long, 8 ft. 6 in. wide, over end sills, and 12 ft. 6 in. high from top of rail. The special equipment will include: metal bolsters, Westinghouse air-brakes, Janney couplers and draft rigging, Railway Steel-Spring Co.'s springs, and Griffin wheels.

The Ingersoll-Sergeant Drill Company, of New York, has ordered six gondola cars of 100,000 lbs. capacity from the Pressed Steel Car Company. These cars will be 40 ft. long over end sills, and 9 ft. 10 in. wide over side sills. Special equipment includes Kelso steel couplers, wooden drop ends, Westinghouse draft rigging, arch bar trucks, gray iron journal boxes, M. C. B. journal bearings and wedges, 700-lb. wheels and pressed steel bolsters and brake-beams.

The Mexican Central has ordered 10 tank cars from the American Car & Foundry Co., for November delivery. The special equipment includes: American Car & Foundry Co.'s axles, cast steel bolsters, National-Hollow brake-beams, Westinghouse air-brakes and draft rigging, Mexican Central standard brasses and trucks, Tower couplers, Soule dust guards, McCord journal boxes and lids, Sherwin-Williams paint, Pittsburg Spring & Steel Co.'s springs, and American Car & Foundry Co.'s wheels.

The Grand Rapids & Indiana, as reported in our issue of Oct. 9, is having 30 gondola cars of 100,000 lbs. capacity built by the American Car & Foundry Company for December, 1903, delivery. The cars will be 40 ft. long over end sills, and 9 ft. 10 in. wide over stakes. Special equipment includes American Car & Foundry Company's 33-in. cast iron wheels, Diamond trucks, with metal spring plank; pressed steel bolsters, Westinghouse brakes and draft rigging, Tower couplers and National Hollow 2½ in. brake-beams.

The Cumberland Valley, as reported in our issue of October 16, is building five wide vestibule coaches and four baggage express cars at its Chambersburg shops. The coaches will weigh 70,000 lbs., and measure 67 ft. 2¾ in. long, 10 ft. ¾ in. wide, and 14 ft. 9 in. high. The baggage express coaches will be 50 ft. long, 9 ft. 8 in. wide and 15 ft. high. The special equipment for both includes: "Diamond" special brake-beams, American Brake-Shoe & Foundry Co.'s brake-shoes for coaches, Westinghouse air-brakes, and Edwards curtain fixtures for coaches.

The Schwarzschild & Sulzberger Packing Company, as reported in our issue of Oct. 9, has ordered 100 refrigerator cars of 60,000 lbs. capacity from the American Car & Foundry Company. The cars will weigh 45,000 lbs., and will be 34 ft. 6 in. long, 8 ft. 10½ in. wide over end sills, and 12 ft. 3½ in. high from top of rail to eaves. Special equipment includes Commonwealth Steel Company's bolsters, Simplex brake-beams, Westinghouse air-brakes, diamond archbar trucks, and United Fiber Company's flax fiber for insulation. The company is also building 100 refrigerator cars of 60,000 lbs. capacity at its own shops. These cars will have the same specifications as those above.

BRIDGE BUILDING.

ABERDEEN, OHIO.—The Chesapeake & Ohio, local reports say, will build a bridge over the Ohio River at Aberdeen to Maysville, Ky.

ALBANY, N. Y.—Bids are wanted Oct. 26 by the Superintendent of Public Works, for rebuilding the middle pier of the bridge over the Black River at Carthage, and building a retaining wall to the south approach and extending the north approach, the work to be completed by Jan. 1; also for building a bridge over the Champlain Canal connecting Burke avenue with Francis street at Mechanicville, work to be finished before April 1, 1904; also for building a new concrete steel floor, with brick pavement, for the bridge over the Erie Canal at Main street at Lockport, the work to be finished July 1, 1904.

ALLENTOWN, PA.—Plans are being prepared by Emil Stevenson, of Pittsburg, for the new steel bridge over the Lehigh River for the State Board of Public Grounds and Buildings. Bids for the building of the bridge may be asked next month.

ATTLEBORO, MASS.—The special commission has filed a report recommending the elevation of the New York, New Haven & Hartford in Attleboro. This will abolish 10 dangerous grade crossings. The total expense of the work will be about $600,000.

BENTONVILLE, ARK.—The Levying Court of Benton County will raise $12,000 to build a State bridge over the White River.

BIRMINGHAM, ALA.—The county will build a bridge over the Warrior River at a cost of about $10,000.

BRANDON, MAN.—A deputation from the City Council and Board of Trade waited upon the Dominion Government and opposed the building of a wooden overhead bridge over the Canadian Pacific tracks at this place. A steel bridge is asked for.

BROOKVILLE, IND.—Separate bids are wanted Oct. 24 by G. Ray King, Franklin County Auditor, for the superstructure of a bridge over Dry Fork and one over Bull Fork.

CHAMBERSBURG, PA.—The County Commissioners have been petitioned to build a new bridge over Carococheegue Creek at Market street.

CINCINNATI, OHIO.—The Council has been petitioned to build a viaduct over the Ohio River between Belleville and Newport, Ky.

CITY OF MEXICO, MEX.—The official railroad bridge inspector of the Mexican Government has refused to accept six bridges built by the Mexican Central on its new division between San Pedro and Paredon, and will not permit the road to be opened until they have been replaced.

COLUMBUS, OHIO.—A dispute as to whether the bids were filed before 12 o'clock, Oct. 5, for the St. Clair avenue viaduct has caused the Commissioners to reject all bids received. The bids have not been opened, and new ones probably will be asked.

CORDOVA, STATE OF VERA CRUZ, MEX.—A number of new bridges are to be built on the Vera Cruz & Pacific Railroad to replace the temporary structures which were put in at the time the road was built. The Midland Bridge Company has the contract for this work.

DOYLESTOWN, PA.—Bucks County will rebuild a 60-ft. bridge at Yardley, and a 36-ft. bridge at Erwinna recently destroyed by floods.

FARGO, N. DAK.—Bids are being asked by the County Auditor for the building of several county bridges.

FREDERICTON, N. B.—The Provincial Government intend to carry out considerable bridge work, which includes the stone and steel structure, to replace Hall's Creek bridge in Westmoreland county and a similar structure to replace the Norton bridge in King's county. The contract will shortly be awarded for substructure of French Fort Cove bridge, parish of Newcastle, and tenders for the steel superstructure will be asked. Repairs costing $7,500 will be made at the Bathurst Basin bridge at Bathurst.

GREENFIELD, IND.—The Board of Commissioners of Hancock County asks bids up to Nov. 7 for the building of about 14 bridges in the county. Robert G. Wilson, Commissioner.

HARRISBURG, PA.—The Mulberry street iron viaduct, recently damaged by fire, may be rebuilt at a cost of about $100,000 to the city. Experts have reported in favor of the work.

KANSAS CITY, KAN.—A contract has been awarded to the American Bridge Company, New York, at $84,000, for building a steel bridge over the Kansas River at Twelfth street.

Bids are wanted by Frank Holcomb, County Clerk, at 12 o'clock noon, Nov. 9, for building the steel bridge over the Kansas River at Fifth street.

LA SALLE, MICH.—The project to build a new steel bridge over the Popple River is under consideration, to replace the present structure, which has been condemned.

LEAVENWORTH, KAN.—The Leavenworth, Kansas & Western may soon build a steel viaduct in place of the present structure.

NILES, OHIO.—The commissioners have reported to the Council that they are ready to build Mosquito Creek bridge, but recommend that a temporary bridge be built for immediate use.

PARKERSBURG, W. VA.—The George West Steel Bridge Company, recently organized with a capital of $100,000, proposes to build a bridge over the Little Kanawha River at George street.

POTTSVILLE, PA.—The borough, the county, the Philadelphia & Reading Railroad and the Pennsylvania are to jointly build a $100,000 viaduct over the railroad tracks to connect the eastern and western sections of the town.

POWHATAN, ARK.—Bids are wanted 3 p. m., Oct. 31, by L. B. Poindexter, Lawrence County Judge at Powhatan, Ark., for building a steel bridge of two 125-ft. spans, on stone piers, concrete pillars or steel tubes, over Spring River at Ravenden.

ROCHESTER, N. Y.—A bridge at a point north of Seneca Park, 400 ft. long, may soon be built.

ROCK, KAN.—The Commissioners of Cowley County will soon let a contract for a new arch bridge over Rock Creek.

ST. LOUIS, MO.—The Board of Public Improvements has postponed action towards building the Taylor avenue bridge, as there is no available money in the city treasury.

SAN FRANCISCO, CAL.—The Atchison, Topeka & Santa Fe, it is reported, has its plans approved for the bridge at Third and Channel streets.

The Lincoln, San Francisco & Eastern will build four steel bridges on its proposed line from Vernon Landing, on the Sacramento River, to Nevada City. See Railroad Construction.

SCRANTON, PA.—The Council has passed an ordinance for the building of a new bridge at Albright avenue.

The resolution providing for changing the Seventh street viaduct from concrete to a steel structure has been indefinitely postponed.

STILLWATER, MINN.—The city has under consideration the building of a new bridge over the St. Croix River, to replace the present structure, at a cost of about $54,000.

TRENTON, N. J.—The Senate has passed a resolution requesting the Governor of that State to confer with the Governor of Pennsylvania, with a view to establishing free bridges in place of those recently destroyed by floods, to be built and maintained by the two States.

WARREN, PA.—The Town Council has authorized the preparing of plans for a bridge to be built over Conewango Creek on Penn avenue.

The bridge committee has reported to the Council in favor of a new suspension footbridge.

WHEELING, W. VA.—A bridge may be built over the creek jointly by the City Railway Company, the city, and the Wheeling Traction Company in Wheeling.

WINNEMUCCA, NEV.—Bids are wanted Nov. 2 by J. T. Dunn, Humboldt County Clerk, for building a bridge over Humboldt River near Golconda; also for a steel bridge 16 ft. wide.

Other Structures.

AMARILLO, TEXAS.—The Fort Worth & Denver City, the Southern Kansas, the Santa Fe and the Choctaw, Oklahoma & Gulf, press reports say, will jointly rebuild the station in Amarillo, recently destroyed by fire at a loss of about $25,000.

AUGUSTA, GA.—The Southern, local reports state, will build a new freight house on the site of the old South Carolina R. R. yards between Washington and Center streets. The building is to be 30 ft. wide and 500 ft. long.

BRIDGEBURY, ONT.—The Grand Trunk, it is reported, is preparing plans to build a new roundhouse at Bridgebury.

CHATTANOOGA, TENN.—The Queen & Crescent, reports say, has plans ready to enlarge its shops at a cost of about $100,000.

CHICKASHA, IND. T.—The Chicago, Rock Island & Pacific, it is reported, will build a new station and also enlarge its shops at this place.

CITY OF MEXICO, MEXICO.—The contract for building all of the section houses, station buildings and roundhouse on the Paredon division of the Mexican Central Railroad has been let to Messrs. Hampson & Smith, Mexico City.

GREENWICH, CONN.—The New York, New Haven & Hartford, it is reported, will build a new passenger station at Greenwich.

LOS ANGELES, CAL.—The Los Angeles Railway Company, local reports say, is building large shops at a cost of about $300,000. The company proposes to build all the cars needed by the Huntington street railways.

MERIDIAN, MISS.—The Southern, local reports say, has plans ready for the union station to be built in Meridian.

MYSTIC, CONN.—The Groton & Stonington Street Ry., it is reported, is preparing plans for a power house, and bids for its construction may be asked next month.

NEWARK, N. J.—Plans for the new station of the Delaware, Lackawanna & Western at Roseville avenue, and the track depression work now in progress, have been approved by the Board of Works.

PINE BLUFF, ARK.—The Pine Bluff Commercial League is negotiating with the Varner, Cummings & Eastern to induce that company to build a union station and shops in Pine Bluff, towards the cost of which the city is to contribute about $25,000.

PLATTSBURG, N. Y.—An officer of the Delaware & Hud-

son says that his company is building an "L" shaped shop, one story high of brick, 148 ft. x 82 ft. 6 in. x 47 ft. 6 in.; a storeroom of brick, 60 ft. x 30 ft., with 8 ft. platform; a 90 ft. four-stall addition to roundhouse, with oil and wash rooms attached. The aggregate cost is $25,000.

ST. LOUIS, MO.—The St. Louis & Suburban, it is reported, has plans ready for a three-story stone office building to be built on Morgan street at a cost of about $100,000.

ST. PAUL, MINN.—Plans have been filed by the Northern Pacific for its new freight house to be built at John and Fifth streets. The building is to be 1,000 ft. long by 40 ft. wide, two stories high, and to cost about $100,000.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

APPALACHICOLA NORTHERN.—It is stated that contracts will shortly be let for this proposed railroad from River Junction Fla., north to Appalachicola, 73 miles. C. B. Duffy, Worcester, Mass., is President; J. H. Trump, Valdosta, Ga., is Secretary. (Sept. 18, p. 680.)

BINGHAMTON & SOUTHERN.—The location surveys for this proposed line from Williamsport, Pa., northeast to Binghamton, N. Y., 130 miles, have been completed. The route passes through Montoursville, Loyalsock, Camptown, Rush and Vestal. A. B. Walter, Harrisburg, Pa., is President. (Oct. 2, p. 713.)

BLUE ISLAND, RIVERDALE & HAMMOND (ELECTRIC).—A charter has been granted this company in Illinois to build from West Pullman southwest to Joliet, 60 miles. The offices of the company will be in Chicago. W. R. Orvin, A. W. Miller, Ira J. Ayer, W. S. McCall and F. E. White, all of Chicago, are incorporators.

BUFFALO & SUSQUEHANNA.—It is reported that the route of the new extension from Wellsville, N. Y., northwest to Buffalo has now been decided upon. The line will be 84 miles long, and will follow the west side of the Genesee River, passing through Scio, Belmont, Belvidere, Belfast, Sandusky, Sardinia, Springfield and other towns to Buffalo. (June 17, p. 534.)

CHEBOYGAN SOUTHERN.—Incorporation has been granted this company in Michigan to build from Cheboygan southwest through the counties of Cheboygan and Emmett to Pellston, 15 miles. Connection will be made with the Grand Rapids & Indiana at Pellston. The principal offices of the company are at Cheboygan. H. W. Carey, East Lake, Mich.; R. B. Gillette, Benton Harbor, Mich., and others are incorporators.

CHICAGO GREAT WESTERN.—Press reports state that a cut-off will be built by this company from Reinbeck, Iowa, east to Dubuque, 95 miles. The present line between these points is roundabout and runs north to Oelwein from Dubuque.

CHICAGO, ROCK ISLAND & PACIFIC.—The contractors at work on the extension from Winterset, Iowa, to Greenfield, 26 miles, have been ordered to discontinue all work on the line. No reason for this order has yet been made public. The contractors have completed grading on eight miles of the line. (Aug. 19, p. 594.)

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—An officer writes that the reports of the improvements to be made by this company in St. Paul have been greatly exaggerated. The company intends to lay a few new tracks adjacent to the present yards and plans for this are now being made.

CHIHUAHUA & PACIFIC.—Preliminary surveys are now being made for a branch line from El Carpio to Rincon, 60 miles. H. W. Edwards, Chihuahua, Mexico, is Chief Engineer.

CINCINNATI RAPID TRANSIT (ELECTRIC).—This company has been incorporated in Ohio to build an electric railroad for freight and passenger service from Cincinnati northeast via Norwood to Dayton. Work will be begun between Cincinnati and Norwood, three miles, at once. C. H. Rowe, H. H. Hoffman, M. E. Ingalls, M. J. Freiberg and others, of Cincinnati, are incorporators.

COLORADO, OKLAHOMA & TEXAS.—Contract for building from Duncan, Ind. T., to Lawton, 25 miles, has been let to the Missouri & Kansas Construction Company. Contracts for building from Lawton northwest to Hobart, 50 miles, and from Ardmore northwest to Duncan, 45 miles, will shortly be let. Connection will be made with the Chicago, Rock Island & Pacific at Duncan. (June 19, p. 429.)

FLINT RIVER & GULF.—An extension of time has been granted this company for building the first 15 miles of its line. The road is projected from Ashburn, Ga., via Sylvester and Camilla to Bainbridge, 90 miles. T. R. Bennett, Camilla, Ga., is Secretary.

GREAT NORTHERN.—In the annual report of this company for the last fiscal year, announcement is made that an extension will be built during the coming year from Pelican Rapids, Minn., north to Mackintosh, in Polk County, 70 miles. Location surveys for this line have been completed.

INDIANA HARBOR.—Rights of way have been secured and preliminary surveys have been made for this proposed railroad from Indiana Harbor, on Lake Michigan, southwest through Lake, Newton and Vigo and other counties to the coal fields in Sullivan County, Ind. C. W. Hotchkiss, Indiana Harbor, is the engineer in charge of the work. (March 27, p. 240.)

INDIANAPOLIS, LOGANSPORT & CHICAGO.—It is reported that this company has let a contract for building its line between Indianapolis and Logansport to the Soule Construction Company, and that the work will be completed by July 4, 1904. Bids for grading by sub-contractors were reported as being too high, and new bids are now being asked. (July 24, p. 548.)

IOWA CITY, DAVENPORT & MUSCATINE (ELECTRIC).—Articles of incorporation have been filed by this company in Iowa. It is proposed to build an electric railroad from Davenport, Iowa, in a westerly direction through Scott, Cedar, Muscatine and Johnson Counties to Iowa City, 60 miles. H. R. Berry, Iowa City, is President, and Milton Remley is Secretary.

IOWA ROADS.—Press reports state that an electric railroad will shortly be built from Cedar Rapids, Iowa, to Waterloo, 54 miles. Surveys are now being made. W. G. Dows and Isaac B. Smith, of Cedar Rapids, are interested.

IRWIN & MCKEESPORT.—Incorporation has been granted this company in Pennsylvania to build from Irwin, in Westmoreland County, in a westerly direction to a point in Allegheny County, 7½ miles. John George, Irwin, Pa., is President.

KANSAS CITY, MEXICO & ORIENT.—An officer is reported as saying that 38 miles of the road east from Topolobampo are in actual operation, and that grading has been completed to Fuerte, 61 miles. Location surveys have been finished to a point 100 miles east of Topolobampo.

LINCOLN, SAN FRANCISCO & EASTERN.—An officer writes that this railroad is now being built from Vernon Landing, Cal., in a northerly direction up the east bank of the Feather River to Nicholaus, in Sutter County; thence east to Lincoln, and then northeast through Spenceville and Grass Valley to Nevada City, 68 miles. Grading has been completed for 10 miles, and track laying will be begun within 30 days. Bids for grading the remainder of the road have been asked for and contract will be let at once. Contracts for ties, rails and bridges have not yet been let. The company expects to have the road completed from Vernon to Lincoln, 25½ miles, by April 1, 1904. For three-fourths of the distance through which the road is to pass, the country is level, while the remaining distance is through the foothills, where the grades will average from 60 ft. to 80 ft. per mile. There are no tunnels and only a few small trestles. C. L. Wilson, Room 18, Nevada Block, San Francisco, Cal., is President. (Sept. 18, p. 680.)

LIVE OAK & PERRY.—An officer writes that work will shortly be begun on this railroad from Live Oak, Fla., southwest to Perry, 50 miles. Grading will be done by the company's forces. Thomas Dowling, Live Oak, is President. (Oct. 16, p. 754.)

MARYVILLE & ST. JOSEPH (ELECTRIC).—Surveys are now in progress for this proposed electric railroad from Parnell, Mo., through Maryville to St. Joseph, 60 miles. The new line will parallel the Kansas City, St. Joseph & Council Bluffs. R. M. Bradbury, Stephen H. Kemp, J. W. Thompson and others, of Maryville, Mo., are interested.

MEXICAN & GREAT EASTERN.—See Xico & San Rafael.

MEXICAN ROADS.—It is reported that the Western of Mexico, which runs from the port of Altata northeast to Culiacan, is to be extended in a northeasterly direction to Topia, in the State of Durango, 70 miles. Sebastian Camacho is the owner of the road, with headquarters at Culiacan.

The Ferro Carril Central Tabasquena has been organized for the purpose of building a railroad from San Juan Bautista north to Nacajuca, and thence northwest to Cunduacan, 50 miles, all in the State of Tabasco, Mexico. The concession for building this road has been granted by the Mexican Government and surveys are now being made. The head office of the company is at San Juan Bautista.

MONTANA ROADS.—Surveys are reported in progress for a railroad from Cooke, Mont., to Red Lodge, 40 miles. B. B. Kelly, Cooke, Mont., is interested.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—An officer writes that nothing definite has yet been decided with regard to building an extension from Lax, Ala., south to Decatur, 15 miles. (Oct. 9, p. 730.)

NEW MEXICO & PACIFIC.—Surveys have been completed for this proposed railroad from Raton, N. Mex., north through the Moreno and Taos valleys to Elizabethtown, Colfax County, 80 miles. O. H. Turner, Raton, N. Mex., is Chief Engineer. (See Construction Supplement.)

OMAHA & SOUTHERN.—Articles of incorporation have been filed by this company in Nebraska, to build from Omaha southwest to Papillion, 15 miles. The new line will parallel the Union Pacific between these points. B. E. Wilcox, A. A. Tully, J. J. Ryan, C. E. Miller and others, of Omaha, are incorporators.

PADEN CITY, MIDDLEBOURNE & SALEM (ELECTRIC).—A charter has been granted this company in West Virginia to build an electric railroad from Baden City southeast through Middlebourne to Salem, 35 miles. Robert Miller, Paden City, W. Va.; G. E. Work, Sistersville, and others are incorporators.

PENNSYLVANIA.—President Cassatt has authorized the statement that the suspension of construction work on the Pennsylvania Lines is not to be general, but will include only part of the work planned. He is quoted as follows: "We have stopped part of the work but there will be no general reduction. The suspension will include the heavy work on the low-grade improvements between Columbia and Parkesburg, and between Thorndale and Paoli, on the Philadelphia Division. We expect to go on with this work in the spring. This is the only work of importance which has been stopped."

SHELBY COUNTY TRACTION.—Articles of incorporation have been filed by this company in Tennessee. It is proposed to build an electric railroad from Memphis southeast to Colliersville, 18 miles, passing through Aulon, Bartlyn, Germantown, Forest Hill and Neville. The line will parallel the Southern Railway between these points. T. J. Lathan, H. C. Williamson, J. M. Hill, I. B. Hudson, and others of Memphis are interested.

SOUTHERN PACIFIC.—Press reports state that the second track between San Bruno, Cal., and San Jose, 39 miles, has been completed and that trains are now running between these points.

SUMPTER VALLEY.—Grading is now in progress on this railroad from Whitney, Ore., west to the new town of Tipton. The Utah Construction Company are the contractors. J. C. West, Ogden, is the engineer in charge of the work. (July 31, p. 562.)

TRINITY & BRAZOS VALLEY.—An officer writes that the line from Mexia, Texas, to Hillsboro, 49 miles, was opened for traffic on Oct. 20. Surveys are now being made for the remaining portion of the line to Cleburne, 20 miles beyond Hillsboro. (Sept. 4, p. 642.)

WICHITA VALLEY.—An officer writes that location surveys are now being made for an extension from Wichita Falls, Tex., northeast in the direction of Benvanue, Clay County. Bids for grading will be received about Nov. 1. J. W. Field, Wichita Falls, is the engineer in charge of the work. (Oct. 16, p. 750.)

WILKESBARRE TERMINAL.—A charter has been granted this company in Pennsylvania to build a railroad 3½ miles long from Wilkesbarre to a point in the borough of Ashley, Luzerne County, Pa. W. H. Smith, Jeddo, Pa., is President.

XICO & SAN RAFAEL.—This railroad, which runs from the City of Mexico south to Apapasco, 110 miles, has been reorganized. The road will be operated in future under the name of the Mexican & Great Eastern. Press reports state that work will be begun very shortly on an extension south to the Isthmus of Tehuantepec.

GENERAL RAILROAD NEWS.

BRUNSWICK & BIRMINGHAM.—The syndicate which owns this company has bought the Hawkinsville & Florida Southern running from Hawkinsville, in Pulaski County, Ga., to Worth, 44 miles. The company has also acquired the Fitzgerald branch running from a point on the Hawkinsville & Florida Southern to Isaac. The present terminus of the Brunswick & Birmingham is at a point just beyond Irwinville, and is so located that by building a three-mile connection to Isaac, the two roads will be connected.

CHICAGO, BURLINGTON & QUINCY.—The gross earnings of this company for the fiscal year ending June 30 were $62,638,378. Operating expenses were $40,542,472, leaving net earnings of $22,442,446. After the payment of fixed charges and dividends, a surplus was left of $4,491,537.

CHICAGO, ROCK ISLAND & PACIFIC.—The gross earnings of this company for the fiscal year ending June 30 were $42,752,556. Operating expenses were $26,890,980, and net earnings $15,861,576. After paying fixed charges and dividends there was a surplus of $3,890,262. The report states that during the last 15 months the mileage of the company has been increased to 5,579 by the addition of the Burlington, Cedar Rapids & Northern, the Rock Island & Peoria, and lines in Oklahoma.

ERIE.—This company has purchased control of the Bath & Hammondsport, which is 10 miles long, running from Bath, N. Y., to Hammondsport. It connects with the Erie at Bath.

HAWKINSVILLE & FLORIDA SOUTHERN.—See Brunswick & Birmingham.

HOCKING VALLEY.—Redmond, Kerr & Co. are offering at par and interest "Hocking Valley participation certificates," issued by J. P. Morgan & Co., dated June 28, 1903, and due June 28, 1906, with interest at 5 per cent. per annum, payable semi-annually. The total issue of $7,270,410 is secured by deposit of $6,934,200 of the $11,000,000 common stock of the Hocking Valley. The certificates are guaranteed as follows: One-third by the Pittsburg, Cincinnati, Chicago & St. Louis, one-sixth by the Lake Shore & Michigan Southern, one-sixth by the Baltimore & Ohio, one-sixth by the Erie and one-sixth by the Chesapeake & Ohio.

INDIANA, ILLINOIS & IOWA.—This company has filed with the Secretary of the State of Michigan articles of consolidation of its companies in the States of Indiana, Illinois and Iowa, under the same name.

NEW YORK & OTTAWA.—The property and franchises of this company will be sold at auction at St. Regis Falls, N. Y., Nov. 20. As this company owns the stock and bonds of the Ottawa & New York, the sale will include the control of both roads. The Ottawa & New York runs from Tupper Lake, N. Y., to Ottawa, Ont., 128 miles. H. W. Gays, 27 Pine street, New York City, is the receiver.

NEW YORK, NEW HAVEN & HARTFORD.—President Hall's successor, C. S. Mellen, who has been elected a director of the company, will necessarily, under the company's charter, make his residence in New Haven. An officer says that the company during the first three months of the present fiscal year has had an increase of gross earnings of about 10 per cent., the increase showing in the freight and passenger departments as well as in the marine department. The power station for the Readville shops, 10 miles from Boston, has been built on a large scale, with a view to electrifying the tracks for the suburban trains to Dedham, and the opening of that service, using the tracks under the Boston terminal station, will probably follow the report of the Massachusetts Railroad Commission to the next State Legislature fixing fares. The operation of the Providence, Warren & Bristol by electricity for its third year shows greatly increased returns and profits.

READING COMPANY.—At a recent meeting of the directors of this company, a dividend of 1½ per cent. was declared on the second preferred stock. This is the first dividend ever paid on this stock. The directors also declared the regular semi-annual dividend of 2 per cent. on the first preferred stock.

SCHENECTADY ELECTRIC.—Authority has been granted this company by the State Railroad Commission to increase its capital stock from $600,000 to $7,000,000. The company operates an electric railroad in Schenectady, Albany and Rensselaer Counties in New York State. The increase in capital is to be used for improvements and for taking over the stock of the Mohawk Gas Company of Schenectady.

SOUTHERN.—At the annual meeting of the stockholders of this company on Oct. 13, it was voted to approve the proposed merger of the Knoxville & Ohio, the Knoxville & Bristol and the Villa Rica, with the Southern Railway Company.

UNION PACIFIC.—J. C. Stubbs, Traffic Director of the Harriman Lines, has issued the following statement showing that over $104,000,000 has been expended during the past three years for improvements and new equipment on the Union Pacific, Southern Pacific, Chicago & Alton and Kansas City Southern systems.

Name of company.	Sundry betterments.	Changes of line.	New equipment.	Total of all
Union Pac..	$8,898,559	$8,690,070	$8,780,380	$26,369,009
Oregon S. L.	4,287,083	...	3,985,049	8,272,132
Ore. R. & N.	2,326,698	1,442,005	813,579	4,582,282
U. P. sys..	$15,512,340	$10,132,075	$13,579,008	$39,223,423
So. Pacific..	20,462,218	...	22,518,135	42,980,353
Ogden & Lu.	...	4,400,162	...	4,400,162
U. P. & S. P. sys....	$35,974,558	$14,532,237	$36,097,143	$86,603,938
Chic. & A...	7,497,101	...	5,446,228	12,943,329
K. C. So...	3,143,928	...	1,657,174	4,801,102
T'l all lines.	$46,615,587	$14,532,227	$43,200,545	$104,348,369

Mr. Stubbs says that the aggregate expenditure of all the companies (over $100,000,000) will be greatly increased by appropriations for work now under way. Despite the fact that over $43,000,000 has been spent in the past three years for new locomotives and cars, the volume of traffic to-day is greater than the facilities for handling it. This is especially true of the Southern Pacific. The Union Pacific is perhaps in the best shape, so far as equipment is concerned, but it has no surplus of cars or engines.

WABASH.—At the annual meeting of the stockholders of this company, an issue of $10,000,000 of bonds was approved for terminal improvements at Omaha, Kansas City, St. Louis, Chicago, Quincy, Detroit and Toledo.